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PREFACE

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ABSTRACTS

MONOGRAPH/REPORTS

MR-104-A USAREUR Force Structure. R. D. Howe, W. D. O'Malley. 1993.

This report describes an approach to structuring the United States Army Europe (USAREUR) in the middle to late 1990s as a function of the mission of that command. The study finds that as long as it retains forces in Europe, the Army will serve as the ground arm of the United States European Command (USEUCOM), as the visible symbol of U.S. involvement in, and commitment to, European security and stability, and as the counter to the potential power of the Soviet Union (or unified successor). Meeting these functions will require a future USAREUR that is visible, capable, flexible, and expandable. Specifically, USAREUR must have a more balanced and flexible force structure than in the past, with likely missions requiring that a larger fraction of USAREUR have enhanced strategic (theater) mobility. Most importantly, USAREUR requires a clear and complete mission to determine the force levels it will need.

MR-105-A Quantifying the Battlefield: RAND Research at the National Training Center. M. Goldsmith, J. Grossman, J. M. Sollinger. 1993.

This report discusses RAND's research approach at the National Training Center (NTC), describes some of the representative studies completed over the past eight years, and illustrates how the Army uses the results. The research process identifies discrepancies among training, doctrine, and practice; constructs hypotheses about causes; and then supports or refutes them by examining data in standard data bases or gathered from focused field collection efforts. One of the two studies addressed in detail in the report estimated the frequency of ground-to-ground fratricide (1 to 3 percent of Blue Force kills) and concluded that improved command and control could prevent most fratricides. Another study focused on tactical reconnaissance and found that although a clear correlation exists between success in battle and reconnaissance, essential reconnaissance tasks were accomplished in only half the battles, and Blue Force scouts were frequently engaged by the enemy. The document also shows how such studies have contributed to Army decisions affecting doctrine, training, and equipment.

MR-113-OSD/AF/A Data Rearrangement and Real-Time Computation. P. N. Armstrong. 1993.

This report displays special switching networks and memory systems that permit simultaneous storage and rearrangement of data so that the required difference between input and output data sequences can be accommodated without expenditure of time. The document begins by discussing elements of several self-sorting machines (SSMs) of current interest and describes their relation to machines that perform the tasks of self-rearranging memory (SRM). Then, the document outlines five computing systems, including programmable arithmetic processors and SRMs, and describes a few potential applications of SRMs that display the advantages such systems provide generally, and particularly in military defense systems (e.g., target missile assignment problems). The document concludes with several conclusions about multiple-string rearranging memory (MSRM) and single-string rearranging memory (SSRM) machines and includes suggestions for future research, such as programming, the advantages to be gained from MSRM, and the class of computations for which an SSRM/processor is adequate.

MR-114-A Assumption-Based Planning: A Planning Tool for Very Uncertain Times. J. A. Dewar, C. H. Builder, W. M. Hix, M. H. Levin. 1993.

This report documents the five steps of a strategic planning methodology (Assumption-Based Planning) RAND has developed over the last four years, provides examples of the methodology (showing its application in an end-to-end exemplar of the Army's long-range planning exercise - Army 21), and suggests some lessons learned from the applications. The five steps of the methodology are (1) identifying important assumptions underlying an organization's operations or plans; (2) identifying assumption vulnerabilities within the planning horizon; (3) defining signposts (i.e., indicators or warning signs of a change in an assumption's vulnerability); (4) defining shaping actions (actions taken to avert or cause the failure of an assumption); and (5) defining hedging actions (actions taken to better prepare for the failure of an assumption). The document compares ABP with other methodologies and argues that the methodology provides a systematic way of thinking about and dealing with a future containing fundamental uncertainties about an organization's ends.

MR-115-A Support Forces in Contingency Operations: Implications for the Army Active-Reserve Mix (U). R. E. Sortor, T. F. Lippiatt, J. M. Polich. 1994. SECRET NOFORN NOCONTRACT

(U) This report examines a range of contingency scenarios and derives the support forces, including the appropriate mix of active and reserve units, needed to sustain the combat forces in various contingency environments. This structure is compared with alternative Army force structures, including the 1995 Base Force. The analysis indicates that the Base Force and an Active Component (AC) end-strength of 535,000 would meet the support requirements only under very optimistic assumptions about the timing of mobilization. It concludes that with the limited AC personnel available,

the requirements place a premium on ensuring that Reserve Component support units are used to the maximum extent possible. The alternative is to place more echelon above division and echelon above corps support capability in the AC at the expense of having fewer active combat units. Further, some restructuring of the Base Force is needed if the units are to match the requirements postulated.

MR-118-A Distributed Training of Armor Officers. J. D. Winkler, S. Way-Smith, G. A. Moody, H. Farris, J. P. Kahan, C. Donnell. 1993.

Using the Armor Officer Advanced Course (AOAC) as a case study, this report identifies alternative approaches for individual training and analyzes their cost implications. The study shows that 5 percent of the material in the AOAC is unrelated to job performance and could be considered for elimination from resident training. The study also finds that distributed training can provide some savings; however, its potential is limited because the amount of the distributable material is smaller than initial expectations-on the order of 25 percent, not the 40 to 60 percent called for in initial planning. Cost savings from distributed training depend on the mix of training media and technologies to conduct it (the higher tech the mix, the greater the start-up costs and the smaller the recurring savings) and on whether sufficient capacity exists to conduct it at soldiers' home stations. Ultimately, the study argues for a modest role for distributed training, involving in-place technologies such as paper, videotape, and personal computers, and only as much material as can be absorbed by soldiers and field units without interfering with daily operations and readiness.

MR-119-A Device-Based Training of Armor Crewmen. G. A. Moody, S. Way-Smith, H. Farris, J. D. Winkler, J. P. Kahan, C. Donnell. 1993.

Using the Abrams Tank Crewman One-Step Unit Training as a case study, this study identifies alternative approaches for individual training and analyzes their cost implications. It suggests that although the current course's content and length is consistent with job requirements in the initial duty assignment, more efficient training techniques can be used in resident instruction. The analysis shows that many armor-specific tasks currently taught using tanks can be taught using training aids, devices, simulators, and simulations (TADSS). In addition, the amount of computer-based training (CBT) can be increased in basic training. Expanded use of TADSS to replace training on vehicles can provide substantial savings in operating and support costs, but the level of costs and savings depends on how the devices and course changes are implemented. If new trainers and simulators must be developed and procured, savings will be cut. The study also found that savings differ across devices. Although substituting TADSS for tanks appears cost effective, the evidence for CBT is mixed.

MR-120-A Computer-Based Training of Cannon Fire Direction Specialists. H. Farris, W. L. Spencer, J. D. Winkler, J. P. Kahan. 1993.

Using the advanced individual training of Cannon Fire Direction Specialists as a case study, this report identifies alternative approaches for individual training and analyzes their cost implications. The study suggests that the current course can be reorganized to reduce course length and conserve resources while meeting fundamental training objectives. Specifically, 20 percent of the current training time contains tasks that may not be performed in the subsequent duty assignment. The analysis further identifies tasks well-suited for computer-based training (CBT). These tasks, which cover fire detection center and fire mission operations, require complex computational and diagnostic skills that are hard to train and, thus, lend themselves to individualized CBT instruction. If CBT were implemented along with other steps to realign the course, additional savings in training manpower and costs could be realized. Although the cost of courseware development will affect the savings, a payback period of three years should prove economically justified given the continuing battlefield requirement for technical support to fire missions.

MR-123-A Planning Reserve Mobilization: Inferences from Operation Desert Shield. R. E. Sortor, T. Lippiatt, J. M. Polich. 1993.

This report identifies problems and issues raised by Operation Desert Shield (ODS) that could affect the Army's use of reserves in future contingencies and summarizes issues that deserve further analysis. It argues that ODS departed from past reserve planning because there was little warning and no specific deployment plan for using the reserves in such a contingency. Based on the ODS experience, issues relevant for future operations include reviewing the 200K call-up mechanism, taking measures to reduce assembly and movement time, developing guidelines to specify post-mobilization training activities, examining the role of reserves in sustaining an extended deployment, preparing active and reserve units for a range of scenarios, and conveying the idea that training and unit relationships in peacetime may be changed abruptly in a contingency.

MR-124-A Post-Mobilization Training of Army Reserve Component Combat Units. T. Lippiatt, J. M. Polich, R. E. Sortor. 1992.

This report investigates how long it takes Reserve Component (RC) combat units to mobilize and prepare for deployment. It is based on data from Operation Desert Shield training of combat brigades, data from the Army Inspector General, Active unit training programs, and RAND observations of RC Annual Training. The analysis first defines twelve post-mobilization activities that RC combat units must complete before they are ready to load equipment for overseas shipment. It then estimates the time needed for the twelve activities under three scenarios (optimistic, intermediate, and pessimistic), which vary in

assumptions about future RC peacetime training proficiency. The report finds that the optimistic case will require 79 days; the intermediate case, 104 days; and the pessimistic case, 128 days. These estimates assume that leadership can complete its command and control training in parallel with troop training and that adequate training support from the Active Component will be available. If either assumption does not hold, then more time would be required.

MR-125-A Mobilization and Train-Up Times for Army Reserve Component Support Units. T. Lippiatt, J. M. Polich, R. E. Sortor, P. K. Dey. 1992.

This report documents research into the time it takes Reserve Component (RC) support units (such as transportation, engineers, military police, or artillery) to mobilize and prepare for deployment. Using data from 606 units called to duty during Operation Desert Shield, the analysis shows that the times depend on the unit's branch, size (weight of equipment), and mode of transportation (air or sea). Units deploying by air can be ready very quickly (8 to 25 days from call-up to the point when they are ready to load equipment for overseas shipment). Units deploying by sea take longer to prepare (typically 30 days, but up to 10 days more for heavy artillery units), but have more flexibility because they can continue some training while their equipment is in transit to the theater. The report illustrates how the results can make large differences in Active-Reserve allocation decisions. The methodology, which was applied here to a notional Southwest Asia scenario, will allow defense planners to determine whether particular types of RC units can be available in time to respond to future contingencies.

MR-127-AF/A New Political Realities and the Gulf: Egypt, Syria and Jordan. M. E. Morris. 1993.

This report highlights points of vulnerability in Egypt, Syria, and Jordan that could lead to future internal and regional instability. The study finds that while there is little evidence of immediate instability in Egypt, the ingredients for it-massive economic and bureaucratic problems, along with a growing number of fundamentalists-exist. Syria's currently pro-Western mode is a pragmatic rather than ideological change; a reversal of course, if coupled with an Iranian alliance, could alter the regional balance of power. And the potential for internal instability in Jordan is high, extending to Palestinians throughout the region and affecting all Middle Eastern states, including the Gulf. The study concludes that the internal stability of the three states is integral to U.S. Middle East objectives and that by addressing regional problems with a multiplicity of approaches, by understanding the problems in context, and by choosing issues on which it can have the greatest impact, the United States can address causes of instability rather than symptoms.

MR-158-A/AF Measuring the Leverage: Assessing Military Contributions to Drug Interdiction. C. H. Builder. 1993.

This report analyzes the problems of measuring the effectiveness of military operations in support of drug interdiction from several perspectives: from the military's extensive historical experience with interdiction campaigns, from the military's traditional means for assigning responsibility and granting authority, and from the changing relationship between the military and public through the news media. In sum, these perspectives suggest that any interdiction campaign devoted to controlling illegal drugs will be both difficult to assess and controversial. It will be difficult not just because of the fractionation of tasks and responsibilities or because of restrictive rules of engagement, but mostly because of the complex and dynamic nature of interdiction campaigns. It will be controversial not just because drug control or use of the military is controversial, but mostly because of the changing nature of a society with an abundance of public information. The concerns should not be with the difficulties of assessment or the controversy that may attend assessments, but with ensuring clear lines of military responsibility and authority and with the validity of the overall strategy that has led to military operations in support of drug interdiction.

MR-160-AF/A MapView User's Guide. L. McDonough, S. Bailey, A. Koehler. 1993.

This document is a user's guide for MapView, a general-purpose, object-oriented graphics program that was developed as part of the Theater Level Campaign/Nonlinear Combat project at RAND. It is written in the C programming language and runs under the X11 Release 5 windowing environment with Sun Microsystems' OPEN LOOK Toolkit. The program allows scenarios to be generated through a flexible, user-friendly interface that defines graphic objects, places them on an underlying image, and modifies or queries them as desired. In addition, MapView can process a file of commands that define and modify graphic objects and create animated simulation output. MapView has proven useful in checking database validity, generating scenarios, constructing runtime animation frames, and providing post-processing analysis.

MR-163-OSD/A/AF The RAND Metadata Management System (RMMS): A Metadata Storage Facility to Support Data Interoperability, Reuse, and Sharing. S. Cammarata, I. Kameny, J. Lender, C. Replogle. 1995.

This report describes the RAND Metadata Management System (RMMS), a system that manages metadata—definitional and descriptional information about databases, simulation models, and procedures—for relational databases such as those maintained in INGRES. Many of these databases have little documentation or other descriptional information to accompany them, making it difficult for users to understand the definitions, abbreviations, acronyms, and descriptions of the data elements stored and maintained in a database management system. The authors developed the RMMS with five major goals in mind: (1) provide complete, thorough, and

standard database documentation; (2) record and manage information about different versions of each database; (3) maintain a history of the changes made to database tables, schema, or data values; (4) facilitate deriving databases for input to simulation models and for sharing among models; and (5) standardize the names of data elements that are conceptually the same but named differently or are named the same but are conceptually different. This report should be of help to users of other relational databases who would like to develop a similar metadata repository for their own set of databases.

MR-164-A/OSD Army Experiences with Deployment Planning in Operation Desert Shield. J. P. Stucker, I. Kameny. 1993.

This report documents the Army's experiences with deployment planning and with deployment-planning systems during Operation Desert Shield (ODS). Analysis of ODS experiences suggests that although Army deployments were planned and executed reasonably quickly and smoothly, there were areas in need of improvement. First, ODS experiences suggest that procedures for deployment planning should be repackaged to emphasize flexibility and adaptability. Second, after contingency- planning and execution procedures have been improved, computerized deployment support systems need to be refocused and updated. At the highest level, planners need automated tools for planning and gaming as aids in decisionmaking; as the planning proceeds, several levels of data need to be linked so that planning and deployments can be conducted effectively by the operating and trans- portation commands and simultaneously monitored and coordinated by the higher-level commands. Finally, personnel skills should also be refocused and upgraded by strengthening career paths for planning personnel, increasing the training and practice of those personnel in realistic, no-plan, and unexpectedly stressful scenarios, and creating ways to use crisis-planning tools in day-to-day peacetime operations.

MR-167-AF/A Political Dynamics and Security in the Arabian Peninsula Through the 1990s. J. A. Kechichian. 1993.

This report argues that the Persian Gulf war rapidly accelerated an ongoing polarization of the Arab world. The result has been an Arab community split into two distinct camps: aspiring non-autocratic states arrayed against more countries that embrace traditional political values and processes. From the tangled skein that characterizes Mideast politics, four major threads can be identified: (1) the re-establishment of the authority of Baathist Iraq and its rebuilding of ties to the Arab world; (2) the political and military awakening of Saudi Arabia; (3) the intractable internal dilemmas of the Gulf shaykhdoms; and (4) the continuing challenge to the ruling establishments to introduce true political reform. Political and military relations between the United States and the Gulf Cooperation Council will continue to grow for the foreseeable future. But growing internal dissatisfaction in the Gulf states may spark anti-American sentiments, and these issues need to be better understood.

MR-171-OSD/A Defense Downsizing: An Evaluation of Alternative Voluntary Separation Payments to Military Personnel. D. W. Grissmer, R. L. Eisenman, W. W. Taylor. 1995.

This report documents RAND's research effort on one aspect of the personnel drawdown—how to structure voluntary separation offers to service members to efficiently meet force-reduction objectives. This research was carried out before development of the voluntary separation programs initiated between 1992 and 1994 and was instrumental in shaping them. The authors address the question of what part of the reductions should come from lowered accession levels and what part from increased separations of personnel currently in the service. They identify the criteria that any separation plan should meet and develop a methodology for estimating the acceptance rate of voluntary separation offers. They apply this methodology to evaluate a range of such offers and then address the process of how to structure separation offers to get both the number and type of desired departures as cost effectively as possible. Finally they address questions concerning the financing of such offers by estimating the savings from reduced retirement outlays.

MR-175-OSD/AF/A Military Applications of Microelectromechanical Systems. K. W. Brendley, R. Steeb. 1993.

Microelectromechanical systems (MEMS) are small devices on the scale of a few millimeters or less. This monograph reports the results of discussions with U.S. researchers about potential military applications. To indicate the range of possibilities, the authors describe five applications: chemical sensors for soldiers, devices to identify other soldiers as friends or foes, active surfaces, distributed sensor nets, and microrobotic electronic disabling systems. Since planned U.S. investments in MEMS lag an order of magnitude behind investments in Japan, Germany and the Netherlands, the authors recommend that the U.S. develop and pursue reasonable target applications for demonstration in three to five years. This would allow assessment of the military potential of the technology and enable the U.S. to capitalize on breakthroughs elsewhere and to develop countermeasures as necessary.

MR-176-A Advanced Technology for Theater Ballistic Missile Defense (U). D. C. McGarvey, S. W. Levinson, R. Y. Pei. 1993. SECRET

(U) This report emphasizes advanced technologies whose application could alleviate shortfalls generated by responses by tactical ballistic missile (TBM) developers to near-term theater missile defense (TMD) systems. The study defines a Baseline TMD that represents the best judgment of the study participants on the basic elements of a near-term TMD architecture. Potential threats responsive to this architecture are identified, the impact of

these potential threats on the baseline TMD performance is evaluated, and the resulting desired improvements in TMD capabilities are identified. The study concludes that Hyper Velocity Guns and Projectiles (HVG&P) should not be pursued for boost-phase interception, since rocket-propelled interceptors can perform as well and present much less technical risk; however, for cluster kills, both HVG&P and multi-kill vehicle (KV) interception are potential candidates. The study recommends that (1) feasibility studies be carried out for multi-KV concepts and cost-effectiveness comparisons of rocket and gun kinetic kill vehicle (KKV) concepts for midcourse cluster kills; and (2) that airborne laser radar technology development be focused on airborne TMD applications.

MR-177-ACQ/A/AF Army Organic Close Support Systems Analysis: Attack Helicopters and Advanced Artillery (U). M. Callero, C. T. Veit. 1993. SECRET LIMITED: US GOV'T AGENCIES

(U) This report provides high-level decisionmakers with an understanding of operational concepts for supporting engaged ground forces on the modern battlefield and the relative effectiveness of systems capable of providing close support for ground forces. Two types of advanced weapon systems are organic to the Army: attack helicopters, and advanced rocket and missile artillery. The attack helicopters include AH-64 Apaches and RAH-66 Comanches that carry either laser-guided or fire-and-forget anti-armor missiles as well as rockets and machine guns. The advanced rocket and missile artillery could include multiple launch rocket systems (MLRS) armed with anti-armor terminally guided weapons (TGW) and remotely controlled non-line-of-sight (NLOS) missiles with on-board optical systems. The authors conclude that significant improvement of artillery and helicopter aviation close support capability requires developing and acquiring new technology armament/munitions. In addition, current programs to develop and field the Longbow missile system and the RAH-66 Comanche will result in significant improvements to attack helicopter close support operations in both kills and attrition.

MR-178-AF/A/OSD The Independent European Force: Costs of Independence. M. B. Berman, G. M. Carter, R. W. Robinson, D. Kassing, R. Buenneke, R. W. Hess, M. Hura, M. Nelson, P. S. Steinberg. 1993.

This report examines the costs associated with acquiring and operating two key components of an independent European force—force projection and surveillance/C2I systems. The study examines three levels of capability for these components and generates "back of the envelope" cost analyses, providing a gross estimate of the trade-offs available between capability and cost. The study finds that force projection dominates the low-capability case (around two-thirds of the cost), but in the medium- and high-capability cases, the two components contribute roughly equally to the cost for an independent European force. In terms of trade-offs, the modest systems of the low case provide some independent capability, but for many uses, they will require the aid of robust U.S. systems to minimize risk. The high case will provide more robustness, but even this will not match U.S. capabilities in force projection. Moreover, the study argues that beyond the cost considerations are the inevitable command and control problems of trying to set up and operate an independent European force.

MR-185-A The U.S. Military Role in a Changing Asia: Preparing for the 21st Century: A Documented Briefing. N. D. Levin, P. J. Bracken. 1994.

This report presents the results of an examination of U.S. and U.S. military roles in a changing Asia. The document argues that trends in both Asia and United States are stimulating a new kind of regional dynamic that, left unattended, could adversely affect U.S. interests. Based on this trend analysis, the study concludes that the United States needs a new strategy of comprehensive security—a strategy of access that involves maintaining alliances and forward presence; using the military indirectly to create a foundation for coalition activities; fostering and directing a regional security dialogue; encouraging alternative development paths to restrain proliferation; and using arms control to bolster U.S. presence, establish regional equilibrium, and lock in the current U.S. advantageous strategic position. Such a strategy involves adding some military roles to prevent regional imbalance and realignments, provide regional presence for rapid response and humanitarian assistance, provide a catalyst/forward trigger for U.S.-led coalitions (including the UN), and help exploit Asian dynamism and strengthen U.S. leverage.

MR-195-A Overview of the Total Army Design and Cost System. R. L. Petruschell, J. H. Bigelow, J. G. Bolten. 1993.

This report describes an integrated collection of models, procedures, and databases called the Total Army Design and Cost System, which is designed to address a broad range of force structure and resource allocations issues and to determine the resource implications of narrower but more detailed proposed changes within the framework of the Total Army. Starting with the results of combat analysis, the first element of the system—the Theater Support Model—estimates the number of support units needed for the combat forces. The total force requirement is then passed to the Transition to War Model, which determines the future peacetime Army, including active and reserve components, needed to provide the necessary forces given a desired deployment schedule. The Path Model then compares the present force with the desired future forces and provides a road map—a series of inventories of Army units, beginning with the present force and ending with the desired future force—to follow in achieving the future force. The Total Army Cost Model completes the final step of translating the inventories into annual cost and resource requirements.

MR-198-A Light Helicopter Trade-off Assessments. M. Callero, C. T. Veit, H. Ory. 1993.

This report assesses the potential impact on operational effectiveness of tailoring four features on the Army's RAH-66 Comanche. Analyses show that for the first feature—targeting system sensor location—locating the targeting system sensors on a mast above the rotor afford significant operational advantages over locating it in the nose. For the second feature—speed and maneuverability reductions—the analyses conclude that a 10 percent reduction in flight performance would not result in significant changes in effectiveness in common operational situations. For the third feature—crashworthiness—there is clear evidence that reduced deaths and permanently disabling injuries (PDIs) resulted when the aircraft met Army standards for vertical velocity attenuation (VVA); however, since bodily impact with an object played a much larger role than deceleration in causing deaths and PDIs, standards for retaining both occupants and objects in the cabin play a substantially larger direct role than VVA features. For the fourth feature—radio frequency interferometer (RFI) inclusion—the assessment indicates that RFI emitter location has utility for both avoiding and suppressing air defenses that warrants its inclusion in the Comanche avionics suite.

MR-221-AF/A From Eastern Europe to Western China: The Growing Role of Turkey in the World and Its Implications for Western Interests. G. E. Fuller. 1993.

This report summarizes many of the broad findings of the project's previous regional papers and reviews those findings from the point of view of Western and American interests. Turkey has been among those states most sharply affected by the changing international environment. Long isolated on the periphery of Europe in geopolitical terms, Turkey now lies at the center of a rapidly evolving Turkic region stretching from the Adriatic to western China, a region in which Ankara is likely to be a key factor. The resulting challenges and opportunities for Turkish foreign and security policy will have an important influence on the way Turkey sees itself and deals with others, including the European Community. Against this background, bilateral relations with the United States will take on increased significance. At the same time, the potential for bilateral friction on regional security issues may expand.

MR-227-A A New Approach for Measuring the Operational Value of Intelligence for Military Operations: Final Report. E. M. Cesar, P. D. Allen, S. C. Bankes, J. R. Bondanella, R. Eden, H. E. Hall, C. Veit, L. Verma, R. Weissler, B. Wilson. 1994.

Policymakers have long needed an improved analytic basis for their investment decisions regarding military intelligence assets. This report presents a new methodology for measuring the operational value of military intelligence, electronic warfare, and target acquisition (IEW/TA) and also describes two prototype models for studying IEW/TA in an operational context. The methodology enables the operational value of intelligence assets and activities to be expressed in quantifiable terms useful to resource acquisition decisionmakers, military planners, and operational managers. One application of the methodology is to help build the intelligence portion of the Army five-year program. The two prototype models were designed as aids for performing policy and other analysis of key issues. One is a spreadsheet model that can be used to assess the operational value of a given IEW/TA architecture at a point in time under various conditions; the other is a dynamic simulation that can be used to study how the value of IEW/TA changes through the course of an operation.

MR-228-A Estimating the Army's Intelligence Requirements and Capabilities for 1997-2001: Analytic Support to the Military Intelligence Relook Task Force. J. R. Bondanella, E. M. Cesar, P. D. Allen, P. Propper, C. L. Shipbaugh. 1993.

This report documents both the process and results of analytic support provided to the Army's Military Intelligence (MI) Relook Task Force. Applying methodology derived from an Arroyo Center project on the operational value of intelligence, electronic warfare, and target acquisition (IEW/TA), the study evaluates the relative contributions of IEW/TA system types across a range of scenarios and missions. It finds that the Army intelligence system needs to be more flexible, that the recent military operations worked because of ad hoc actions and not because of the normal functioning of the organization within the system. Such ad hoc arrangements demonstrate the need for designing modular entities with a flexible and rapidly deployable support package. To reduce the impact in future crisis situations, the Department of Defense, not just the Army, must establish standards and connectivity architectures for new IEW/TA systems. Frequent field trials should be conducted to increase the likelihood that systems will be compatible during future contingency operations.

MR-234-A/DPRC A System Description of the Heroin Trade. M. T. Childress. 1994.

This report describes and discusses applications for a computer spreadsheet-based, comprehensive "systems description" of the quantity and flow of heroin from initial cultivation and processing, through international transportation, to domestic distribution. To examine the potential utility of this tool, this Report details three distinct but related applications: improving the estimation processes, conducting sensitivity analyses, and guiding planning and assessment. In improving the estimation process, an analyst can use the framework to evaluate assumptions or data in terms of their downstream effects on other indicators (e.g., the likely downstream effects of an increase in the opium crop yields). Sensitivity analysis can be used to understand the impact of certain parameters versus others, which may be helpful in allocating intelligence resources, and to evaluate first-order effects of a change in the system, such as an eradication program. As a tool for more effective planning and assessment, the model can help planners think in terms of a strategic framework, for example, of linking assumptions on

production in Southeast Asia to heroin flows in the United States.

MR-235-A/DPRC A System Description of the Marijuana Trade. M. T. Childress. 1994.

This report describes and discusses applications for a computer spreadsheet-based, comprehensive "systems description" of the quantity and flow of marijuana from initial cultivation and processing, through international transportation, to domestic distribution. To examine the potential utility of this tool, this Report details three distinct but related applications: improving the estimation processes, conducting sensitivity analyses, and guiding planning and assessment. In improving the estimation process, an analyst can use the framework to evaluate assumptions or data in terms of their downstream effects on other indicators (e.g., the likely downstream effects of an increase in the marijuana crop yields). Sensitivity analysis can be used to understand the impact of certain parameters versus others, which may be helpful in allocating intelligence resources, and to evaluate first-order effects of a change in the system, such as an eradication program. As a tool for more effective planning and assessment, the model can help planners think in terms of a strategic framework, for example, of linking assumptions on production in Southeast Asia to marijuana flows in the United States.

MR-236-A/AF/DPRC A System Description of the Cocaine Trade. B. Dombey-Moore, S. Resetar, M. T. Childress. 1994.

Gaps and inconsistencies in the picture of the cocaine trade increase the difficulty of making good choices about resource allocation and drug-fighting strategies. They also make it more difficult to evaluate the effectiveness of existing policies. This report documents a computer spreadsheet-based "systems description" for the cocaine trade that is a combination of database and analytical tool. Its structure allows users to substitute their own data or assumptions about parameters while preserving consistency or "conservation of mass" throughout the system. Three systems spreadsheets mirror the general pattern of the cocaine trade: production, international transportation, and U.S. distribution. In addition, a longitudinal database provides primarily production-related data from 1984 through 1990.

MR-240-1-A The New U.S. Strategic Debate. R. D. Asmus. 1994.

This report assesses the process and the multiple and growing pressures for a reexamination of U.S. global strategy and America's role in the world. It argues that a new broad-ranging debate over future American strategy is both likely and desirable. It clearly behooves a smart defense planner to seek to better understand the pressures pushing for such a debate, the fault lines emerging, and the key drivers of elite and public opinion. Until the debate over future U.S. strategy is clarified, it will be difficult for military planners to proceed with clear guidance on future strategic and defense planning—or at least until the issue of the political sustainability of such guidance is established in clear elite and public support. This should not be read as a recipe for inaction, but rather as an appeal for strategists and military planners to try to pay closer attention to issues of domestic political consensus, legitimation, and sustainability, and to how these factors are likely to affect future U.S. strategy.

MR-245-A Department of Defense Assistance to the Former Soviet Republics : Potential Applications of Existing Army Capabilities. S. Hinckley. 1993.

This report explores the feasibility of U.S. Army roles in twelve former Soviet republics and assesses the costs, benefits, and risks of potential Army missions. It focuses on roles that replicate or build on existing Army and DoD assistance programs, especially "dual-purpose" missions that would serve both Army and host-nation interests. The study concludes that although few roles would fully meet key "dual-purpose" criteria, the Army could undertake some modest aid actions in the twelve republics-swiftly and at relatively low cost-that it routinely performs in other countries for largely self-interested reasons. The most promising could be built around small-scale nation assistance actions, primarily involving Reserve Component medical and engineer units, which the Army regularly conducts throughout the developing world, typically in conjunction with scheduled training activity. While the study findings do support a modest Army aid role, they cannot support a recommendation that the Army undertake specific actions absent key situational factors. However, they do argue that the Army's potential as an aid instrument be brought into sharper relief as an instrument available to policymakers.

MR-256-A The Implications for the U.S. Army of Demographic Patterns in the Less Developed World: A Documented Briefing. M. T. Childress, P. A. McCarthy. 1994.

This report analyzes demographic patterns in the less developed world and discusses some preliminary implications for the U.S. Army. The three major demographic trends occurring in the less developed world are rapidly expanding populations, increasing urbanization, and the growing number of displaced people. These trends are important to the U.S. Army because each can exacerbate existing problems in the countries affected by them. These trends can also lead to, and will affect, the nature of future conflict. Consequently, this will have implications for future U.S. Army roles, missions, and operations.

MR-258-A Army Reserve Component Accessions from Personnel Completing Their First Active-Duty Enlistment. R. J. Buddin, S. J. Kirin. 1994.

The planned restructuring of the Army Active Component (AC) will affect the size and composition (occupation, paygrade, recruit quality) of the prior service accession pool available to the Reserve Component (RC). This

report examines factors that affect whether prior-service personnel affiliate with RC units. The goal is to identify soldiers who are likely to join the RC and understand what can be done to improve the rate of transition of prior service soldiers into the reserves. The study focuses on the transition rates of active-duty first-term soldiers into the RC. A major finding of the research is that recruits with shorter terms of service in the AC are substantially more likely to join the RC at the completion of their AC tour. Holding constant other recruit characteristics, about 50 percent of two-year enlistees join the reserves as compared with 40 and 30 percent of three- and four-year enlistees, respectively. This finding suggests that a shift to shorter terms might ease RC manning problems because it would cycle people who are disposed to joining the RC more quickly through the AC.

MR-303-A The Army's Role in Domestic Disaster Support: An Assessment of Policy Choices. J. Y. Schrader. 1993.

This report begins identifying the central issues for determining the appropriate Army role in disaster relief. The study finds three potential options for an expanded Army role in civil emergency response: (1) continue to support the Federal Emergency Management Administration's (FEMA's) leadership of disaster response planning; (2) expand the Director of Military Support office to include formal state liaison offices; and (3) designate civil disaster support as a fifth pillar of national defense strategy and incorporate disaster-support missions into the Army's primary missions. The last two options expand the Army's current role and will require both internal changes and outside actions. While weighing these options and examining the issues surrounding them, the Army should take three steps to make its force ready to meet the current expectations of the American people in the event of a disaster at home: (1) transfer executive authority for military support from the Secretary of the Army to the Chairman of the Joint Chiefs; (2) support formal acceptance of civil disaster response as a mission for both active and reserve forces; and (3) review legal constraints on military participation in civil disaster relief.

MR-306-A Evaluation Framework for Unified Command Plans: A Documented Briefing. P. J. Bracken, J. Winnefeld, R. Howe, M. C. Harrell. 1993.

This report presents a formal process for evaluating Unified Command Plans (UCP) that assesses the likely performance of competing alternative UCPs in the near future by evaluating them against specific performance criteria. The performance criteria are effective use of military power, efficiency, responsiveness, crisis adaptability, simplicity, alliance responsibilities, regional expertise, and organizational interface. For demonstration purposes, the report presents four illustrative UCPs that bound the range of alternative approaches, along with three alternative world view/strategy pairs to compare the illustrative UCPs with. The evaluation of the illustrative UCPs reveals that such an approach would be valuable in highlighting sources of disagreement as an aid to reaching conclusions about the alternatives. As an aid to discussing the adaptability of plans, the report presents alternative long-range futures in which the world is dramatically different from what is expected in the near future and in which the U.S. strategy might become more activist. Review of these alternatives indicates that any UCP should be designed with considerable emphasis on the ability to learn and adapt to changing conditions.

MR-311-A/USN Using Value to Manage Repair Parts: A Documented Briefing. M. K. Brauner, J. S. Hodges, D. A. Relles. 1993.

This report documents a briefing that presents a method for examining the effect that various stockage policies have on the length of time weapon replaceable assemblies (WRAs) spend waiting for parts. The authors argue that the current stockage policies—which emphasize descriptors of parts and rarely include information about the end-item that needs them—likely contribute to the simultaneous problems of long repair turnaround times (TATs) and excesses of repair parts. The report discusses an algorithm which incorporates both parts descriptors and output measures, that minimizes the expected length of time an end-item spends in repair. The authors research suggests that through effective stockage of repair parts, the Services may be able to achieve large savings from shortening the TAT at depot, which allows more end-items to be in circulation. Furthermore, the authors evaluations suggest that their calculations can identify weapons systems where it would make sense to stock parts and those where it would not. The calculations can be used to balance investment strategies between spending money on parts and spending it on other segments of the repair pipeline.

MR-313-A/USN An Approach to Under-standing the Value of Parts. M. K. Brauner, J. S. Hodges, D. A. Relles. 1994.

This report proposes a way to think about the stockage decisions service maintenance depots must make. The approach involves defining the value of each part so the costs of parts can be related to their effects on fixing end-items. Very simply if a part breaks frequently and tends to hold up the repair of an expensive end-item, then a spare is very valuable. Using the measure of value, the authors develop a rank-ordered list of repair parts: The higher it is on the list, the more valuable the part is to reducing the value of the repair pipeline. The stockage problem posed is an instance of the classic knapsack problem; the algorithm is a heuristic solution, a greedy algorithm. Simulation tests show that the method does a good job of setting authorized stockage levels. The simulations also suggest that large savings may be possible, and they identify the weapon systems for which savings are likely to accrue. The results make the case for experimenting with the method at a depot or a remanufacturing site.

MR-314-A/USN Models and Algorithms for Repair Parts Investment and Management. J. S. Hodges. 1993.

This report proposes a way to think about the investments and operating decisions service maintenance depots must make, distinguishing between a long-run (investment) problem and a short-run (operating) problem. The basis of the authors approach to both problems involves defining the value of each part or supply action so the costs of parts or supply actions can be related to their effects, thereby permitting managers to select courses of action that maximize value given the cost of the actions. For the long-term problem, the approach attributes value to the units of authorized stock in terms of the effect they have on the value of the repair pipeline: efficient choices yield a cheap repair pipeline. For the short-run problem, the approach attributes value to supply actions (e.g., speedup of delivery of due-in items) in terms of the effect they have on the availability of aircraft at the end of a specific time horizon. For each problem, the authors provide the relevant definition of value, an algorithm to maximize value for a given cost, and methods for computing value.

MR-331-ONDCP/A/DPRC Controlling Cocaine: Supply Versus Demand Programs. C. P. Rydell, S. M. S. Everingham. 1994.

This report analyzes the relative cost-effectiveness of various available drug interventions. Four such interventions analyzed in this document are (1) source country control; (2) interdiction; (3) domestic enforcement; and (4) treatment of heavy users. The first three of these programs focus on "supply-control," whereby the cost of supplying cocaine is increased by seizing drugs and assets and by arresting and incarcerating dealers and their agents. The fourth program is a "demand-control" program because it reduces consumption directly, without going through the price mechanism. This study states that an estimated $13 billion are being spent in the United States each year on the four drug programs listed above and that the bulk of those resources are spent on domestic enforcement. Treatment of heavy users has only a small percentage of this budget, even when privately funded treatment is included. Given the high cost of "supply control" programs, this report concludes that treatment of heavy users may be a more cost-effective way of dealing with drug interventions.

MR-332-ONDCP/A/DPRC Modeling the Demand for Cocaine. S. M. S. Everingham, C. P. Rydell. 1994.

This report documents the development of a two-state Markovian model of the demand for cocaine and includes the estimation of incidence, prevalence, cohort retention, and consumption. The Markovian model is required to fit (1) the overall prevalence data; (2) the fraction of all users that are heavy users in 1985, 1988, and 1990; and (3) the fraction of a cohort of initiates that is still using drugs ten years later, the ten-year cohort retention rate. The study states that the incidence of new users into light cocaine use has varied greatly over the years and is an input to the model; however, the model cannot predict future prevalence-it can only project prevalence given a hypothetical incidence scenario. The model also demonstrates that the fraction of all cocaine users who are heavy users has varied greatly over time, and that peak heavy usage followed peak incidence by about ten years. Consequently, the effect on heavy usage of government programs that reduce incidence (such as prevention programs) will only be realized many years later.

MR-338-A Maturing Weapon Systems for Improved Availability at Lower Costs. J. Dumond, R. Eden, D. McIver, H. Shulman. 1994.

This report advocates an approach to reducing the reliability and maintainability (R&M) burden associated with advanced weapon systems such as the Apache helicopter and the M1A1 tank. Maturation development seeks improvements in detecting, reporting, isolating, and removing component faults; it also identifies and implements changes to component design that improve R&M. Maturation development is a dedicated period of intense operation, data collection, and analysis immediately upon fielding a weapon system. The purpose is to detect and isolate design deficiencies by intensively operating the components in a fixed configuration within the normal operating environment. Another key element is a well-developed management information system linked to an integrated R&M database to facilitate efficient and effective resolution of the R&M problems associated with high-tech components. Maturation development can be applied both to new systems and to major modifications of fielded systems. The potential benefits of maturation development are the achievement of full designed system performance and a reduction in lifecycle support costs.

MR-352-A Policy Options for Army Involvement in Youth Development. E. H. Ondaatje. 1993.

This report presents a framework for examining the Army's role in youth development activities. It argues that the growing popularity of youth community service and the urge in policy circles to draw upon the military to help youth suggest that youth development will be increasingly important for the Army. It further argues that the Army's current efforts are insufficient to withstand the mounting pressure on the Army to do more for the nation's youth. The report posits five options for expanding the youth development effort, compares them in terms of such factors as how much effort they require and who participates, and then presents a framework for evaluating the impact of the options on such things as Army missions and budgets. The report recommends that the Army understand what it is already doing for civilian youth and quantify the benefits of military service for the nation's youth who serve in the military and that the Army attempt to reduce the polarization of the current debate over whether support for youth development is an appropriate Army role.

MR-359-A The Building Blocks of Russia's Future Military Doctrine. E. B. Rumer. 1994.

This report examines the fundamental factors that will determine the direction of Russia's security policy and military doctrine. The report argues that if Russia remains

a truncated empire, neo-imperialism is likely to dominate its national security policy and military doctrine, which would be oriented toward reconstituting its internal empire and expanding through force and intimidation into its old sphere of influence in Eastern and Central Europe and Asia. However, the Report also argues that the greatest threat to Russia's national security is from within (from both economic collapse and significantly diminished military capability) and that the path taken by Russia's political leaders toward resolving that crisis will determine the face it presents to the outside world and its military doctrine. The report concludes that given these uncertainties, U.S. policymakers have few, if any, options for significantly affecting the outcome of Russia's internal transformation. However, these uncertainties also underscore the importance of continuing U.S. involvement and military presence in Europe as a stabilizing force.

MR-363-A Ethnic Conflict in Central Europe and the Balkans: A Framework and U.S. Policy Options. T. S. Szayna. 1994.

This report provides an analytical framework for thinking about the potential for militarized ethnic conflict in the central part of Europe and the Balkans. The report distinguishes between three types of ethnic tensions: (1) a mobilized ethnic group without outside backers, which can escalate to a low-intensity conflict within a specific country; (2) a mobilized ethnic group backed by a neighboring nation-state, which can escalate into an international dispute or border war; and (3) the breakup of federal states made up of ethno-territorial administrative units, which can escalate to armed struggle (a hybrid between a civil war and a war for independence that may escalate into a larger regional war). The report argues that the type of regional ethnic demands is shifting away from outright succession (breakup of states) and toward calls for autonomy. It concludes that U.S. policy should focus on controlling ethnic tensions by limiting their spread, preventing their escalation into militarized conflict, and containing any conflicts that occur; the Report ends with some recommendations for the United States and the Army.

MR-365-A Prisms and Policy: U.S. Security Strategy After the Cold War. N. D. Levin. 1994.

This report reflects the efforts of a group of RAND researchers to think about the implications of recent global and domestic changes for future U.S. national security challenges in great detail-"realism," "multinational security," "democratic internationalism," and "strategic independence." Although the differences between these strategies is profound, the commonalities provide some ground for identifying potential strategy components around which a future U.S. strategy might be developed: redefining the U.S. role in world affairs to deal with a perceived need for continuing U.S. engagement; reformulating U.S. military requirements to meet some core U.S. security concerns (e.g., protecting the security of the United States and of its citizens abroad and impeding the spread of weapons of mass destruction); and ensuring a greater linkage between U.S. foreign policy goals and domestic, especially economic, objectives. The report concludes with three overarching challenges the Administration will face in building a new national security strategy.

MR-366-OSD/A/AF Beyond Consolidation: U.S. Government International Broadcasting in the Post-Cold War Era. J. E. Tedstrom. 1994.

This report examines the debate on the future of Voice of America (VOA) and Radio Free Europe/Radio Liberty (RFE/RL). These organizations enjoyed broad support until their value and purpose were called into question by recent developments abroad and at home: the spread of communications technologies worldwide, the spread of democracy in Eastern Europe and the former Soviet Union, and the tightening of the U.S. budget. This report builds on existing literature and the results of a conference RAND sponsored in April 1933. The writer supports a downsizing of RFE/RL and its eventual consolidation with VOA; housing the new, consolidated broadcasting organization as an independent organization within the U.S. Information Agency; and scaling back broadcasting in Eastern Europe, while expanding services into Asia.

MR-374-A Operation Sea Angel: A Case Study. P. A. McCarthy. 1994.

This report examines the lessons learned in terms of training, doctrine, and force structure from Operation Sea Angel (OSA), an operation comprised of Marine forces supported by Army and Air Force elements, that the United States launched to provide assistance when Cyclone Marian struck Bangladesh in April 1991. In terms of training, OSA indicated that many combat skills are transferable to and exercised by humanitarian situations (e.g., reconnaissance, assessment, transport, and logistics), while areas like joint training, command and control, and deployment training illustrated training deficiencies. OSA clearly demonstrated some doctrinal deficiencies. Doctrine at the joint level needs revision and development; unique aspects of humanitarian operations, including unique aspects of the joint staff planning process, are lacking. Although Army involvement in OSA was limited, several force structure lessons can be inferred. Army forces will be required to provide medical care to joint forces and the indigenous population. In addition, if OSA had been conducted in a hostile situation, or if massive troops were required, Army forces would have faced huge infrastructure problems. Finally, OSA showed that the Army cannot rely on joint forces for communications; establishing a satellite link is essential.

MR-379-A The American Armies: 1993. J. M. Taw, P. A. McCarthy, K. J. Riley. 1994.

This report examines the effects of the changing international environment on the U.S. military and the U.S. Army in particular. The report argues that the dilemma of dealing with changing threats and dramatically reduced budgets that confronts the U.S. military confronts

the Army more acutely—it must broaden its capabilities, adjust its roles and missions, and compete with the other services, all in the face of manpower and budget cuts. While the Army will respond through such internal means as relying more on technology and rethinking its use of the reserves, the Report argues that cooperation between the American armies could counteract some of the effects of the drawdown and decreasing defense budget. For example, sharing rather than duplicating disaster-relief equipment and training, combining counterdrug operations, and leveraging off the Canadian Army's expertise in international peacekeeping could help optimize limited resources. The report concludes that before any of these efforts can take place, the countries of the region must redefine their political and military relationships to prevent being constrained by the residual fears of imperialism.

MR-384-A Transporting the Army for Operation Restore Hope. D. Kassing. 1994.

In Operation Restore Hope (ORH), the Army successfully provided many of the capabilities needed to get food to starving Somalis. This report analyzes Army ORH deployment and makes five observations on how to improve future humanitarian operations. First, the details of planned Army movements varied considerably. DoD should consider adapting planning and operating procedures to place less reliance on detailed plans. Second, humanitarian operations place relatively high demands on support functions (Engineering, Medical, Transportation, Civil Affairs, etc.). The Army may wish to create "ready groups" for such functions. Third, ORH employed six of the nation's best sealift ships, undercutting the Army's ability to carry out its strategic mobility plan. Use of other types of ships should be considered. Fourth, difficulties in offloading prepositioning ships suggest that procedures and plans be re-examined. Finally, the Army needs to develop methods for defining objectives and measuring progress in the performance of humanitarian missions.

MR-388-AF/A The Theater-Level Campaign Model: A Research Prototype for a New Generation of Combat Analysis Model. R. Hillestad, L. Moore. 1996.

Many analysts and decisionmakers argue that an order-of-magnitude leap forward in military modeling for the post-Cold War era—particularly campaign modeling—is essential to improve the quality of analyses, training, acquisition, test and evaluation, and innovative thinking. This research has been a step to ensure that the next-generation campaign models will not be mere rewrites of tools we currently use. We investigated alternatives to four aspects of modeling we think are essential to improving theater-level campaign analysis: (1) how to create more flexible structures to simulate the wide range of future scenarios and their associated uncertainties, (2) how to link to more detailed models in an analytically valid way, (3) how to represent ground forces maneuvering at the theater campaign level, and (4) how to represent adaptive behavior and aspects of command and control better in this type of model. This research provides insights into some of the alternatives and suggested some promising directions. We built the prototype Theater-Level Campaign (TLC) model and used it as a test bed for the different approaches. In many cases, we tried methods and then, finding they were not promising, removed that code and started over in the true spirit of prototyping. We believe this type of prototyping and experimentation is critical to the advancement of the state of the art of campaign modeling and analysis. The various sections of the report describe the results associated with each aspect of our experimentation and conclude with more general observations and recommendations for the future.

MR-393-AF/A Modeling Global Positioning System Effects in the TLC/MLC Model. P. D. Allen. 1994.

This report presents a model design for representing the effects of global positioning satellites (GPS) in support of military operations. Three types of GPS coverage are discussed: (1) absolute GPS, which is the term applied to normal GPS positioning and navigation transmissions over the globe; (2) differential GPS, which can significantly increase the receiver's location accuracy and eliminate the effects of selective availability; and (3) relative GPS, of which there are two types—the first allows a GPS-equipped launcher and a GPS-equipped munition to share location data so that the target location error is decreased, while the second uses sensors to receive and provide more accurate target location data using the reflections from unique signatures within the sensor's field of view. The report also discusses the three main benefits of the design-improved self-location accuracy, improved target location accuracy, and standoff munitions launch-as well as the threats against GPS transmitters, GPS receivers, and GPS signals (specifically, jamming and spoofing, which involves an opponent sending a false message to a GPS receiver to direct the receiver's platform off course).

MR-398-A The Urbanization of Insurgency: The Potential Challenge to U.S. Army Operations. J. M. Taw, B. Hoffman. 1994.

This report evaluates the effects of urbanization and population growth on the conduct of insurgency/counterinsurgency operations and assesses the U.S.'s ability to effectively support foreign nations' counterinsurgency activities. The report argues that as the dual demographic trends of rapid population growth and urbanization continue to change the face of the developing world, the likelihood of urban insurgency is increasing. It also argues that although urban insurgencies have traditionally been the easiest kind to defeat, that may no longer be the case. This means that governments, no longer able to simply rely on their urban counterterrorist or rural counterinsurgency strategies, will have to develop a hybrid strategy that prepares them to fight a broad-based insurgency across rural and urban environments. The report concludes that the United States can provide only limited support in these efforts, because it has neither the resources nor the will to become directly involved. The

United States must realize that there are factors over which it has no control and that before committing its support to a counterinsurgency effort, it must determine how much it is willing to spend, how much it can control, how its efforts will be perceived, and the minimum outcome it will accept.

MR-403-OSD/A SEMINT: Seamless Model Integration. J. Marti, P. Kantar, W. Sollfrey, K. Brendley. 1994.

This report details the design of the Seamless Model Integration program (SEMINT), a software connection system that connects engineering and simulation models without significant reprogramming. We used SEMINT to augment the JANUS combat simulation with improved target acquisition models, surface-to-air combat models, and flight planners. The approach is less expensive than combining these models into a single, monolithic entity. Since recoding is not particularly intrusive, the models can still run in their original stand-alone form. The advantage of our approach is the reuse of existing models, simultaneous use of multiple processors, use of otherwise incompatible programming languages and systems, and ease of implementation and maintenance. Its drawbacks are limited scale-up potential and a central failure point. We used SEMINT to complete a number of analyses that require special intervisibility computations of low-observable vehicles and high-resolution, ground-air combat involving helicopters. This report discusses the approach, the models integrated to date, and the lessons learned during implementation.

MR-434-A The North Korean Nuclear Program: What Is to Be Done? J. C. Wendt. 1994.

This report examines the possible outcomes of the North Korean threat to withdraw from the NPT and outlines alternative approaches for accomplishing U.S. security objectives affected by this situation. The report evaluates four approaches-constructive engagement, grand deal, pressure, and graduated incentives-in terms of whether the approaches help accomplish U.S. security objectives, whether they can be implemented given the other regional players involved, and whether they are robust given the fluidity of the situation in Korea. The report concludes that an approach that combines graduated incentives with pressure if the first approach fails is the most effective approach for meeting all three criteria. Specifically, the graduated incentives approach could accomplish all the U.S. security objectives, while the pressure approach could accomplish the major ones; in terms of implementation, graduated incentives is supported now and would lay the groundwork for regional support for pressure by demonstrating the United States has "gone the extra mile"; and in terms of robustness, graduated incentives would be effective if the North Korean "price" is low enough, while pressure could be effective regardless of North Korean motivation and would be consistent with a policy of counter-proliferation.

MR-435-A The 1962 Howze Board and Army Combat Developments. J. A. Stockfisch. July 1994.

After reviewing Army "combat developments," with special reference to the 1962 U.S. Army Tactical Mobility Requirements Board ("Howze Board"), this report argues that the Army could improve combat developments by closer connection and interaction between its model building and testing activities. Presently, models and their simulations are uncritically used with little attention given to whether the model is empirically validated. This will be troublesome for the Battle Labs when they use simulations to carry out their work. Another problem is that much data or numerical inputs used in models may be of questionable quality, often because it is the output of some other invalidated model. These conditions suggest that the Army's system should have a mechanism that tries to lay out programs of models and assertions about tactics and operational performance that can be empirically validated and sequentially field-tests those assertions. It may even be necessary for the Battle Labs to take on or acquire this function to carry out its objective. Otherwise, imperfect expedients like the Howze Board will continue to be used.

MR-437-A Precision-Guided Logistics: Flexible Support for the Force-Projection Army's High-Tech Weapons. M. L. Robbins, D. W. McIver. 1994.

Drawing on the Army's experience in Operation Just Cause (OJC), Operation Desert Shield (ODS), and Operation Desert Storm (ODSt), this report explores "what if" scenarios for the three operations to examine how well the Army could have supported its new high-technology weapon systems in the face of different stresses. Although the logistic support for all three operations was a success, the "what if" analysis suggests that the forces were vulnerable to risks in the nature of the contingencies; for example, an extended OJC would have severely affected weapon system sustainability, as would have been the case if fighting had erupted early in ODS or if operating tempos were higher than they were in ODSt. To reduce the risks inherent in these uncertainties, the study argues for a more flexible support concept that tailors support packages to the specific needs of different types of contingencies. The research suggests that such a system could help maintain high weapon system availability across the range of contingency uncertainty and could do so at a cost no greater, and almost certainly less, than that of the current structure.

MR-444-FNF/OSD/A/AF Strategy and Public Opinion After the Wall, 1990-1993 = Deutsche Strategie Und Offentliche Meinung Nach Dem Fall Der Mauer 1990-1993. R. D. Asmus. 1994.

This report analyzes the results of a series of public opinion polls conducted for RAND since German unification and designed to identify longer-term public opinion trends on emerging national security issues in a unified Germany. It focuses on the results of the most recent poll conducted in the fall of 1993 before the January 1994 NATO summit. The report also draws on

analyses of survey work conducted in previous years to present a composite picture of trends in German public opinion on national security and alliance issues since German unification. It also integrates the results of interviews with a wide ranging set of German opinion-makers from political parties, public opinion experts, and senior officials in the Ministries of Foreign Affairs and Defense on how to assess the implications of these findings.

MR-445-A/SOCOM The United States Special Operations Command Resource Management Process: An Application of the Strategy-to-Tasks Framework. L. K. Lewis, J. A. Coggin, C. R. Roll. 1994.

This report discusses how a structured methodology called Strategy-to-Tasks can help the U.S. Special Operations Command (USSOCOM) improve its resource allocation and management process. Analysis of USSOCOM's processes and program requirements suggests that RAND's Strategy-to-Tasks methodology might be able to accomplish the task of linking USSOCOM's programs and resources to national security strategy. Specifically, the methodology meets three critical requirements in USSOCOM's program that do not now exist: (1) a top-to bottom linkage of Special Operations Forces (SOF) programs; (2) a more disciplined Planning, Programming, and Budgeting System (PPBS) that includes a clearer understanding of the resource issues (the process includes analytical tools and linked data bases); and (3) a structured process that involves the components in the resource debate. The study created a baseline taxonomy that provides a traceable audit trail from national security and military strategies through operational concept to force elements. It also fosters operationally oriented statements to the Chairman, Joint Chiefs of Staff, the Secretary of Defense, and Congress about special operations force capabilities.

MR-453-A Marching to Different Drummers: Evolution of the Army's Environmental Program. D. S. Rubenson, J. Aroesty, P. W. Wicinas, G. Farnsworth, K. Ramsey. 1994.

This report argues that a more efficient and effective environmental protection program can only be developed with an evolution to a decentralized/coordinated system—a system that is highly dependent on local decisionmaking yet reflects Army commitment to environmental protection. Environmental projects must in the long run be balanced against other needs at an installation rather than overall Army needs. The Army has been forced to assert greater headquarters priority setting to ensure environmental protection at local bases, but ultimately a system that is highly decentralized is most efficient. The report provides three strategic options for evolving toward a fully decentralized/ coordinated system. If more local autonomy is to be relied upon, there must be "a mixing of the shades of green," which would involve more fully training the command in environmental affairs, providing a career path leading toward a Garrison Commander position and other base operations functions. This approach could divert soldiers from military training. An alternative is to "separate the shades of green": establish a base operations chain of command, organized regionally, and potentially with all civilians. Tactical units would be tenants at the bases and would be free to conduct training with fewer base operations responsibilities. The report closes by highlighting the disadvantages and advantages of each approach, but does not recommend a preferred option. A third hybrid approach option is also suggested.

MR-474-A Training Readiness in the Army Reserve Components. R. E. Sortor, T. F. Lippiatt, J. M. Polich, J. C. Crowley. 1994.

This report documents research on the training readiness of high-priority Army Reserve Component units participating in 1992 in the Army's training enhancement program, known as BOLD SHIFT. It seeks to understand the training achievements and shortfalls that were experienced, to identify key factors underlying training readiness, and to suggest potential improvement. The main features of the BOLD SHIFT program—training to more realistically attainable premobilization goals, new concepts for field training, and closer ties between the Active and Reserve Components—seem to be moving in the right direction and well worth continuing. While successful in many dimensions, the program was not able to bring most of the units to their pre-mobilization training and readiness goals. In all cases personnel readiness—having sufficient trained and deployable personnel—is a fundamental challenge.

MR-475-A 1992 Bold Shift Survey Instruments. J. Hawes-Dawson, T. Kaganoff, J. M. Polich, R. E. Sortor. 1994.

This report contains survey instruments and instructions developed to support an assessment of the 1992 BOLD SHIFT reserve training program. The first phase of the assessment was designed to focus primarily on two types of issues: (1) description of unit training activities; and (2) commanders' and soldiers' perceptions of the program. Five survey instruments were developed, focusing on unit training, battalion and brigade staff training, Operational Readiness Exercises, and Unit Leader Battle Skills Courses. The surveys were administered during the late summer and early fall of 1992. Analysis of the results, in conjunction with other data, is intended to provide a comprehensive view of the various initiatives that made up BOLD SHIFT and of their potential for improving Reserve Component unit readiness in the future.

MR-476-A A Method for Measuring the Value of Scout/Reconnaissance. C.T. Veit, M. D. Callero. 1995.

The authors describe a method for developing and using a model to measure the value of scout/reconnaissance to operational performance. The method employs (1) modern measurement techniques to credibly model the human processes involved in situation assessment and operational performance and (2) operator interactive simulation of

scout/recon system operations in high-resolution combat models to represent a system's performance on the battlefield. The situation-assessment/operational-effectiveness model is system independent. It can be used to measure the value of any type of reconnaissance system and is relevant to any ground-combat force, organization, or composition. The method fills a critical gap in analytical support for scout/recon system development and acquisition decisionmaking because it provides a quantitative analytical basis for measuring and comparing combat intelligence systems in terms of resulting operational performance. The model applies only to heavy divisions, having been developed from the judgments of intelligence and operations officers about heavy divisions imminently to be engaged in combat with large, modern, enemy armored forces.

MR-487-A Strategies for Defining the Army's Objective Vision of Command and Control for the 21st Century. E. M. Cesar. 1995.

This report examines the command and control (C2) lessons from Operation Desert Storm (ODS) and, based on those lessons, postulates a set of operational objectives for command, control, communications, and computers (C4) architectures and derives a set of physical and informational needs that such architectures must meet. The study conceptualizes three schematic architectures to fit those needs, examining one in greater detail. In addition, the author outlines several concepts for optimizing C4 architectures, such as providing commanders with a common picture of operations throughout a region and creating a "switchboard in the sky" by pushing information from the sustaining base to an intermediate point that is nominally above the active region where operations are being conducted. The main conclusion of this concept formulation study is that it is feasible for joint task enabling force elements to be more interoperable while moving by adopting new architectures, systems (particularly space systems), technologies and procedures.

MR-489-A Korean Arms Control: Political-Military Strategies, Studies and Games. R. E. Darilek, J. C. Wendt. 1994.

This report presents an overview of three fundamental negotiating strategies for dealing with the Democratic People's Republic of Korea (DPRK) on arms control issues. The first strategy would maintain international pressure on the DPRK to accept both the routine and the challenge inspections required under the Non-Proliferation Treaty (NPT) regime and to proceed with the bilateral North-South inspections endorsed by both sides in 1991. The second strategy would try to influence the future direction of DPRK development. The third strategy would use leverage for prying or dislodging the North from its uncertainty about making constructive arms control arrangements with the South. By treating arms control as a tool of international policymaking that can positively affect the political-military decisions of governments and actively contribute to the achievement of worthwhile objectives (e.g., security, stability, and non-proliferation on the Korean peninsula),the third strategy is the most creative. However, this strategy only works if DPRK nuclear policy is uncertain enough to be susceptible to inducement, or at least capable of movement in one direction or the other.

MR-490-A/AF U.S. Regional Deterrence Strategies. K. Watman, D. Wilkening, J. Arquilla, B. Nichiporuk. 1995.

This report assesses the requirements of a deterrence strategy for application to potential regional adversaries. The authors argue that states content with their status quo (e.g., the former Soviet Union during the Cold War) should be relatively easy to deter, especially from seeking gain, because they are likely to be risk-averse decisionmakers. On the other hand, many regional adversaries, already dissatisfied with the status quo and anticipating further losses, can be hard to deter, though not impossible. Hence, the U.S. military problem of regional deterrence in this instance boils down to two factors: (1) how the United States can make its deterrent threats highly credible; and (2) what military capabilities are required for credible denial and punishment threats. Should an adversary be willing to take high risks, the authors suggest that the United States adopt a national military strategy based on the ability to deny the opponent's political/military objective, either by basing U.S. forces within the region in times of crisis or by convincing the adversary that they can be forward deployed rapidly if the need arises.

MR-491-A Army Morale, Welfare and Recreation Programs in the Future: Maximizing Soldier Benefits in Times of Austerity. S. Way-Smith, E. G. Keating, P. A. Morrison, M. T. Childress. 1994.

This report considers the future of Army morale, welfare, and recreation (MWR) programs. Continued budgetary pressures are forcing changes in Army MWR provision. At the same time, the time that soldiers spend on station may be increasing, more spouses are working outside the home, and funds for on-post housing are shrinking. All these factors push toward the provision of more MWR services by the off-post private sector. This report argues that the costs of MWR provision by government employees are systematically underestimated under current government accounting systems, potentially leading to inappropriate MWR provision decisions. This report develops a costing methodology to compare more accurately the costs of different MWR provision methods. The authors hypothesize that optimal MWR provision might be characterized by more heterogeneity—e.g., traditional MWR approaches at isolated installations, but greater or complete reliance on the local private sector, increase in soldier pay, and a commensurate MWR reduction at installations in urban areas.

MR-496-A Battalion Level Command and Control at the National Training Center. J. Grossman. 1994.

This report provides the results of RAND research on command and control (C2) of battalions as shown in exercises at the National Training Center (NTC). This study had three primary tasks: (1) identify systemic C2 problems at the battalion task force (TF) level and below; (2) identify C2 problems whose resolution could be assisted by technology; and (3) identify C2 problems that can be solved by better home-base training and recommend training improvements. Using a series of sources, the author reached two major conclusions: (1) TF staffs have difficulties generating adequate plans, managing battle preparation, and influencing the execution of the battle; and (2) reporting on the TF command net is inadequate. As a result, the author recommends enhancing the home-base training of the TF staff, digitizing the planning and preparation process, and enhancing and simplifying the reporting systems. The new equipment should also be designed to enhance the home-base training.

MR-497-A/RC Military Support for Youth Development: An Exploratory Analysis. B. J. Asch. 1994.

This report assesses existing evidence about the potential of military service and training as methods to prepare disadvantaged youth for productive roles in the work force and society. It describes the military training model, and the research evidence on effects of military experience on post-service earnings. The evidence reveals the benefits of military related training and education, no research consensus on whether veterans in general receive a positive or negative return to military service; for disadvantaged veterans, it suggests little if any effect. Results also indicate that while minorities are more likely than majority-group members to obtain skills in the Army that are transferable to the civilian sector, they are less likely to leave the Army and to use their educational benefits. The report discusses implications of these findings for future military-based youth development programs and highlights gaps in current knowledge that need to be filled to formulate policy.

MR-500-A/AF Nuclear Deterrence in a Regional Context. D. Wilkening, K. Watman. 1994.

This report addresses the question of deterring nuclear attacks by regional adversaries against the United States, U.S. forces overseas, or U.S. allies. Because emerging nuclear states will have small arsenals at first, regional nuclear threats will be made primarily for three political purposes, to: (1) deter the U.S. from intervening in a regional conflict, (2) intimidate U.S. regional allies; and/or (3) ensure the survival of their state or regime. Effective U.S. deterrent strategies vary depending on the purpose behind the nuclear threat. A U.S. strategy of "escalation dominance" should credibly deter nuclear threats against the U.S. homeland or U.S. forces overseas when the adversary's objective is to prevent U.S. intervention. A U.S. strategy of extended deterrence based on escalation dominance, backed up by theater defenses, should prevent U.S. regional allies from being intimidated by an adversary's nuclear threats. For the third threat, which is the most difficult to deter, U.S. strategy should shift away from retaliatory deterrence to highly effective damage limitation (i.e., counterforce capabilities backed up by effective defenses).

MR-504-A Assessment of Combined Active/Reserve Recruiting Programs. R. Buddin, C. E. Roan. 1994.

This report examines the long-term effects of an experimental Army program that links active and reserve tours. The program, called the "2+2+4 recruiting option," allows new entrants to serve a two-year tour in the Active Component (AC), a two-year tour in a Selected Reserve Component (RC) unit, and then four years in the Individual Ready Reserve. RAND designed the new enlistment option and evaluated the program in a congressionally mandated, controlled experiment. An earlier study showed that the program expanded the market for high-quality enlistees and helped staff hard-to-fill Army occupations. This study shows that 2+2+4 participants are more likely to complete their AC tour and join a RC unit than are other high-quality recruits. Program participants had lower first-term attrition and reenlistment rates than other high-quality recruits, so the program increased the pool of soldiers separating from the AC and available to the RC. In addition, the RC affiliation rate was 80 percent for 2+2+4 participants, as compared with only 43 percent for other recruits. The study concludes that the program helps the AC achieve its recruiting objectives and that it channels trained, experienced personnel into the RC.

MR-510-A Assessing the Utility of Sense and Destroy Armor (SADARM) Against Future Threats (U). J. Matsumura, D. Hinton, G. Halverson. 1995. SECRET NOFORN WNINTEL NOCONTRACT

(U) This report presents the results of an effort to help assess the utility/need for the Sense and Destroy Armor (SADARM) smart artillery submunition among other possible weapon alternatives. Using broad analysis in conjunction with a recently redeveloped system-on-system level smart munition effectiveness model (Force Employment Model to Assess Damage to Armor with Munitions, or FEMP/MADAM), the study examined the effectiveness of SADARM and the alternatives against a number of different threats, assuming different levels of fire-support C3I and different threat tactics. Results show that in certain situations and with technological upgrades, SADARM can be as effective as other future concepts. However, against a challenging threat (similar in capability to U.S. ground forces), many future artillery-based, alternative concepts appear to offer more promise.

MR-518-A An Operational Assessment of the Longbow and the Apache and Comanche Longbow Force Mix (U). M. Callero, M. B. Schaffer, R. Zwirn. 1995. SECRET

(U) This report addresses the preferred number of Apache and Comanche helicopters to be equipped with the Longbow millimeter-wave radar anti-armor system. The study considered technological, atmospheric, and operational factors, and it sought to determine a force mix that would be both operationally and fiscally responsible, i.e., would constrain both operational risk and cost. The Army's development of the Longbow has evolved around the desire to enhance the operational capability of attack helicopters. Current armed helicopters employ laser-guided Hellfire missiles in conjunction with electro-optical targeting systems; as such, they have operational limitations under many degraded atmospheric, environmental, or combat conditions that millimeter-wave radar technology could alleviate and improve target acquisition, lethality, and survivability. Some of these enhancements would also apply to the future Comanche armed-scout helicopter. This report investigates the degree to which these goals might be attained, assesses potential changes in operational effectiveness, and suggests a preferred force mix of Apaches and Comanches to be equipped with the Longbow system in each Army Corps. For contingencies in which additional Longbow capability would be considered essential, Longbow units in nondeployed corps would be available to augment the deployed forces.

MR-545-A Army Active/Reserve Mix: Force Planning for Major Regional Contingencies. R. E. Sortor. 1995.

National military strategy is changing the focus of military planning to include a broader range of missions spanning the spectrum from major regional contingencies (MRCs) to operations other than war. This report documents results from ongoing RAND research on how changing national military strategies and resources might affect the mix of active and reserve component forces in the Army. It describes the portion of the research that has focused on the forces required for major regional contingencies and on the Army forces planned for the late 1990s and the early 21st century. The results of the analysis show that under current planning assumptions, the planned combat force is adequate even when judged against a scenario with two nearly simultaneous contingencies. However, unlike the case for the combat forces, it does not appear that the planned support force structure would provide the required number of units at the needed readiness level to support anything beyond a single modest-sized contingency. Support units other than those in the high-priority contingency force pool do exist in the general war forces; however, given their lack of priority for resources, they may not be ready to deploy in time. This suggests a need to reexamine the support force configuration and reassess readiness in support units.

MR-549-A/OSD Recent Recruiting Trends and Their Implications: Preliminary Analysis and Recommendations. B. J. Asch, B. R. Orvis. 1994.

Because of its extensive background in recruiting research, RAND was asked by the Army and the Office of the Secretary of Defense to evaluate recent recruiting trends. The request comes as a result of mixed indications of the recruiting market, which raised some concerns, particularly for the longer term. This report provides the results of a preliminary analysis of recent trends in enlistment propensity and in the levels of specific supply and demand factors, and their implications for recruiting. The authors found there should be an adequate supply of potential enlistees, and, thus, that reported recruiting difficulties most likely result from factors yet to be analyzed fully, including changes in demand factors such as recruiting practices and resource management or possible changes in the attitudes of key influencers such as parents toward the military. A hedging strategy is needed to ensure resources are in place to meet the increases in the accession mission in FY95-96. The authors suggest an increase in advertising and the removal of ceilings on the number of recruiters. These resources are highly cost-effective and will provide required flexibility.

MR-554/1-A Intervention in Intrastate Conflict: Implications for the Army in the Post-Cold War Era. J. A. Winnefeld, M. C. Harrell, R. Howe, A. Kanter, B. Nichiporuk, P. Steinberg, T. S. Szayna, A. J. Tellis. 1995.

With the end of the Cold War, the nature of conflict within states has turned in the direction of ethnic, nationalist, and separatist struggles. The United States, while maintaining its accustomed readiness to deal with interstate conflict, also has a keen interest in preparing for a range of possible interventions in intrastate conflict. This report, the first of a two-volume study, focuses on helping the Army identify the issues and some of the answers associated with the currents and changes in intrastate conflict. (See also the companion volume, MR-554/2-A, which contains supplemental materials.) Its principal contribution is its use of speculative "case studies" of future conflicts that might involve the United States in general and the U.S. Army in particular. This device is intended to help the Army experience the future before it happens by providing insights that may be useful in performing strategic and program planning, updating doctrine, and supporting intervention operations.

MR-554/2-A Intervention in Intrastate Conflict: Implications for the Army in the Post-Cold War Era: Supplemental Materials. T. S. Szayna, G. E. Fuller, R. D. Howe, B. Nichiporuk, K. J. Riley, A. J. Tellis, J. A. Winnefeld. 1995.

The Arroyo Center conducted a study aimed at helping the Army identify the issues and some of the answers associated with the currents and changes in intrastate conflict in the wake of the Cold War. This report is the supplemental volume to the main report of the study, MR-554/1-A. The bulk of it is devoted to describing six speculative "case studies," drawn from a global survey of actual and potential flashpoints, that describe possible U.S. interventions in intrastate conflict that would involve the Army. The case studies are: (1) implementing peace accords ending the civil war in Sri Lanka; (2) controlling

piracy amidst civil strife in Indonesia; (3) humanitarian relief in a civil war ravaged Algeria; (4) enforcing a cease-fire in a multifaction civil war in South Africa; (5) upholding Macedonian sovereignty in conditions of strife in Kosovo; and (6) humanitarian assistance amidst post-coup social unrest in Venezuela.

MR-560-A Information Technologies and the Future of Land Warfare. B. Nichiporuk, C. H. Builder. 1995.

This study explores the potential impacts of the rapidly expanding information technologies upon the future of land warfare. In early December 1993, RAND convened 18 researchers with expertise in the information sciences and military operations to "brainstorm" on the ways that the fast growing communications and computational capabilities might change the nature of conflicts, the Army's missions, the way the Army organizes, and especially its concepts of operations. The researchers generally agreed that the nature of conflict is changing not so much because of technological changes in the means of warfare as it is because of technological and demographic shifts of power. The causes, participants, and objectives in conflicts are being transformed by the information technologies more rapidly and fundamentally than are the weapons. In the final portion of the document, six new concepts for Army organization or operations are presented. The concepts span a broad range of issues—from the primary role of the soldier on the battlefield to how the Total Army might be organized for its disparate missions. All six concepts would imply significant changes in Army doctrine, training, organization, or equipment.

MR-566-A Operations Other Than War: Implications for the U.S. Army. J. M. Taw, J. E. Peters. 1995.

Post-Cold War political pressures are likely to increase the demand for the U.S. military in general and the U.S. Army in particular to conduct operations other than war (OOTW). This report analyzes how changing demographics worldwide will affect the operational requirements of future OOTW missions. Two key factors that have influenced U.S. success or failure in the past are (1) political-military communication and (2) mission creep and mission swing. Without effective political-military communication, military planning may be derived from political rhetoric or, alternatively, political decisions may be based on faulty understandings of military capabilities or considerations. Equally critical is sufficient recognition of, and planning for, mission creep (in which political goals shift, requiring military operations different from those planned at the intervention's outset) and mission swing (in which the operational environment undergoes quick deterioration or improvement unrelated to the presence or efforts of intervening forces). The report concludes with specific recommendations regarding Army doctrine, training, equipment, and force structure.

MR-569-A Operation Just Cause: Lessons for Operations Other Than War. J. M. Taw. 1996.

The study of past operations is helpful in defining U.S. Army roles and functions in military operations other than war (MOOTW) and in assessing the range of missions and requirements the Army is likely to face in the future. Operation Just Cause (OJC) can be distinguished from subsequent MOOTW in Kuwait, Iraq, Bangladesh, Bosnia, and Somalia because it was a conventional military operation in which humanitarian concerns were secondary. Moreover, OJC was a unilateral operation against a small military with which the United States was very familiar, in a country where U.S. forces were already based. Nevertheless, OJC offers the Army some practical lessons for current and future MOOTW. Among them are the following: (1) planning for MOOTW must not overlook or underemphasize stability operations (as was the case in OJC); (2) special operations forces' employment should be maximized by ensuring that conventional planners and commanders understand how best to use them; and, (3) training, doctrine, and equipment must be developed or adjusted to prepare forces adequately for the challenge of military operations on urban terrain in MOOTW, in which civilians are likely to be present and rules of engagement are likely to be restrictive.

MR-571-A Battalion Reconnaisance Operations at the National Training Center. M. Goldsmith. 1996.

In a prior study of task force scout operations at the NTC, the Arroyo Center identified a series of problems, including inefficient use of time, failure to use available assets, poor scouting techniques, and inadequate supervision by the battalion commander and staff. These problems were caused by doctrinal shortcomings, insufficient training of key personnel, and equipment deficiencies. The study went on to make specific recommendations; as a result, the Army made a number of changes to doctrine, training, and equipment for the scout elements of heavy battalions. This report examines the performance of ten battalion task forces over a period of one year to determine if the "fixes" the Army put in place have been successful. Card questionnaires filled out by observer/controllers dealt with scout platoon operations and the planning and utilization of reconnaissance by battalion headquarters. Although changes instituted by the Army to improve scout operations have been successful, a similar program of change dealing with battalion staff and command operations is necessary.

MR-590-A Assessing the Performance of the Army Reserve Components School System. J. D. Winkler, M. G. Shanley, J. C. Crowley, R. A. Madison, D. Green, J. M. Polich, P. Steinberg, L. McDonald. 1996.

The U.S. Army is launching a series of initiatives to streamline and consolidate its extensive system of schools, including institutions that serve both the active and reserve forces. The eventual aim is to lay a foundation for a longer-term goal: establishing a cohesive and efficient Total Army School System (TASS) of fully accredited and integrated schools to serve all Army components. Given the magnitude of change envisioned for the TASS, the

Arroyo Center was asked to conduct an independent, objective assessment of the operation of the RC school system, including the TASS concept. This report provides a baseline description of the RC training system in terms of three key assessment areas: (1) training requirements and school production; (2) quality of training; and (3) resources and costs, and it discusses potential means for addressing problems in these areas.

MR-607-A Credible Uses of the Distributed Interactive Simulation (DIS) System. J. Dewar, S. Bankes, J. Hodges, T. Lucas, D. Saunders-Newton, P. Vye. 1996.

The Distributed Interactive Simulation (DIS) system is an ambitious effort to take advantage of the tools of the information age to help improve the efficiency and effectiveness of the U.S. military services. Defined broadly, the DIS system is an infrastructure for linking simulations, simulators and live military systems of various types from any of the U.S. military services at multiple locations to create realistic, complex, virtual "worlds" for the simulation of highly interactive activities. It poses serious challenges in the areas of technology, interservice coordination, and verification, validation, and accreditation (VV&A). This report concentrates on the validation challenge and presents a framework that encompasses all of the potential uses of the DIS system. It then illuminates the validation or credibility requirements for each type of use. Because of the breadth of the potential uses of DIS, the resulting framework is general enough to address any military application of models and simulations.

MR-608-FNF/OSD/A/AF Germany's Geopolitical Maturation: Public Opinion and Security Policy in 1994 = Deutschlands geopolitische Reifung : offentliche Meinung und Sicherheitspolitik in 1994. R. D. Asmus. 1995.

Public opinion polls come and go, yet every now and then one captures a society in transition. A poll conducted for RAND and the Friedrich-Naumann Foundation by Infratest Burke Berlin in late 1994, the most recent in a series initiated in 1990 under the rubric of "German Strategy and Public Opinion After the Wall," highlights just how far German public opinion has shifted since the end of the Cold War (as well as where it has not) on a range of foreign and security policy issues central to Germany's future role in Europe and the Atlantic Alliance. Germany's strategic orientation remains unequivocally pro-Western. Public support for NATO is increasing. Germans support a strong European Union (EU), not as an alternative to the Atlantic Alliance but as a stepping stone to a new, more balanced partnership between the United States and Europe. At the same time, Germans are realizing that they face a new and broad spectrum of possible threats and security challenges in and around Europe. Germans have also made the conceptual leap, at least in principle, to a new security role beyond national defense. But whereas Germans support more engagement in principle, they seem to shy away when specific scenarios are involved. Many of the building blocks for a new consensus on security policy may already be in place. This new consensus, however, has not yet come together—perhaps in part because of the lack of leadership and consensus in the political class.

MR-638-AF/A/OSD Aggregation, Disaggregation, and the 3:1 Rule in Ground Combat. P. K. Davis. 1995.

This report illustrates a number of basic principles about aggregation and disaggregation in combat modeling by working through the mathematics and phenomenology of a concrete example. In the example, simplified ground combat takes place in a number of sectors and subsectors within a theater. The author assumes that combat at some level of detail is dictated by the Lanchester square law then discusses whether an aggregate law, Lanchester or otherwise, applies at the next level up (that is, one with more aggregation and less detail). The answer depends on the ratios of several time scales related to information, decisions, maneuver, and the duration of a breakthrough battle. The author also discusses how the 3:1 rule does and does not apply at different levels of combat.

MR-639-AF/A Concept-Level Analytical Procedures for Loading Nonprocessing Communication Satellites with Nonantijam Signals. E. Bedrosian, G. K. Huth. 1996.

This report is the first in a series that presents the analytical procedures required to construct a computer model of a military communication satellite system, load it efficiently with the radio signals required to support an operational scenario, and assess its vulnerability to jamming. The model is intended to facilitate relative, rather than absolute, comparisons between various communication satellite systems, both real and conceptual; only the essential technical characteristics of these systems and the terrestrial terminals with which they are intended to operate are considered. This not only simplifies the construction and operation of the model, but also focuses attention on those elements of the overall system that are of the greatest significance in a comparative analysis. The document also discusses scenarios and earth terminals, but considers only communication satellites incorporating frequency-translating transponders. This report does not address the implementation of the model.

MR-640-AF/A Concept-Level Analytical Procedures for Loading Nonprocessing Communication Satellites with Direct-Sequence, Spread-Spectrum Signals. E. Bedrosian, G. K. Huth. 1996.

This report is the second in a series that presents the analytical procedures and mathematical formulations required to construct a computer model of a military communication satellite system, load it efficiently with the radio signals required to support an operational scenario, and assess its vulnerability to jamming. Only communication satellites incorporating frequency-translating transponders are considered. However, instead of being operated in the linear mode, as was necessary to accommodate the frequency-division-multiplexed, nonantijam signals being considered, the transponders here

are considered to be driven deliberately into saturation and to behave like hard limiters. This is done to obtain the best possible performance of the direct-sequence, spread-spectrum signals of interest. The antijam signaling is important to military communications because of the significant protection it can provide against jamming. This report does not address the implementation of the model.

MR-642-A Materiel Distribution: Improving Support to Army Operations in Peace and War. N. Y. Moore, J. M. Halliday, K. M. Beam, D. W. McIver, M. W. Lewis, F. W. Finnegan, T. Masselink. 1997.

The Arroyo Center undertook a study of materiel distribution in the Army, seeking to analyze the current materiel distribution process, quantify the extent of problems, and identify new concepts that offer the most promise for improving support to Army operations in peace or war. The study revealed that Army distribution is complex and compartmented, that it is slow, and that the problems affecting it are of long standing. Fixing these problems requires a systemic approach, since past stovepipe approaches have not worked. The report points out that industry has met and overcome many of the challenges confronting DoD by combining technology with reorganization and by establishing high performance standards to increase performance and productivity. The authors argue that this approach is a useful model for DoD to explore, and recommend a set of next steps.

MR-659-A Ensuring Personnel Readiness in the Army Reserve Components. B. R. Orvis, H. J. Shukiar, L. McDonald, M. G. Mattock, M. R. Kilburn, M. G. Shanley. 1996.

Many Reserve Component (RC) units activated for Operation Desert Shield/Storm needed to draw people from other units, primarily because they lacked personnel who were duty MOS qualified. In a smaller future Army, this solution might not be feasible (or might lead to deployment delays). This report analyzes methods of improving peacetime job qualification rates, such as increasing flow of qualified soldiers from the Active Army to the RC or reducing job turbulence and attrition within RC units. The study describes a "readiness enhancement model" used to estimate the amount and cost of job qualification improvements, and a "cross-leveling model" used to assess effects of personnel shortfalls on unit deployability. Results indicate that economic incentives could considerably improve peacetime job qualification levels. However, during wartime mobilization high-priority units would still experience shortages in some MOSs, which may need to be solved by adding recruiting incentives or redesigning force structure.

MR-659/1-A The Readiness Enhancement Model: A Personnel Inventory Projection Model of the Army's Reserve Components. H. J. Shukiar. 1996.

This technical report describes the Readiness Enhancement Model, a personnel inventory projection model for the Army's Reserve Components (RC). The model supported the analysis described in Bruce Orvis et al., *Ensuring Personnel Readiness in the Army Reserve Components,* MR-659-A. This model was used to estimate how reduced RC attrition and job turbulence and increased use of prior-service experience would affect RC job qualification rates and annual requirements for recruiting and training. This report would be useful to readers who intend to employ the model or who seek better understanding of the inventory projection environment within which the model operates.

MR-662-A Postmobilization Training Resource Requirements: Army National Guard Heavy Enhanced Brigades. T. Lippiatt, J. Crowley, P. Dey, J. Sollinger. 1996.

This report analyzes the training resources needed for future post-mobilization training of combat brigades in the Army National Guard. It lays out a detailed 102-day post-mobilization model for an "enhanced readiness" heavy brigade, seeking to minimize train-up time by executing many activities in parallel. It then analyzes the key resources required (active trainers, gunnery and maneuver sites, and Opposing Force personnel) to prepare the brigades for deployment, under various options involving multiple training sites. It concludes that under current plans the Army will have sufficient training personnel and other resources to run three training sites simultaneously, assuming that the National Guard can provide an Opposing Force, training support personnel, and garrison support for collective training sites. This would produce as many as three trained brigades as early as 102 days after mobilization. The resource bill, however, would be substantial, and there are risks that the actual training might proceed more slowly. For example, the National Guard would need to train a skilled OPFOR in peacetime (perhaps requiring more training time, equipment, and active duty training support); and the intensive pace of post-mobilization training would require logistics resources such as spare parts and ammunition at a time when other, higher-priority units are also preparing for deployment.

MR-669-A/ARPA An Approach to Replicated Databases for Robust Command and Control. I. Kameny. 1995.

This report presents an approach to making command and control data more timely and robust through the use of replicated distributed data-management techniques. It describes a concept for exposing warfighters to common pictures of the battlefield in an approximation of "real time." The approach aims to develop battlefield situational awareness in spite of communication delays caused by jamming and congestion, network partitioning, node failures, and other hostile actions that might interfere with the rapid horizontal and vertical dissemination of data on the battlefield. A major characteristic of the approach

is that it changes the data-consistency problem from that of globally maintaining consistency among replicated databases of geographically distributed command and control nodes into a local consistency problem at each node. It makes use of a weak data synchronization mechanism between nodes, thereby allowing decisions to be made and actions to be taken based on inconsistent data and inferences. It requires management of historical data, keeping track of actions that are based on the use of possibly inconsistent data, and methods for propagating changes when consistency is later achieved.

MR-672-AF/A Mutual Interference in Fast-Frequency-Hopped, Multiple-Frequency-Shift-Keyed, Spread-Spectrum Communication Satellite System. E. Bedrosian. 1996.

The command and control of modern military forces is increasingly dependent on space assets for a wide variety of functions. Prominent among these assets are communications satellites. Given the high cost of satellite systems, the shrinking military budget, and the volatile world in which they must be used, it is essential to obtain systems that best serve the critical needs at the least cost. As part of its research for the Army and the Air Force, RAND is constructing a concept-level modeling tool for use in evaluating conceptual military communication satellite systems at a systems level; that is, the model is limited to consideration only of basic design parameters. The report presents the results of a theoretical analysis of a frequency-hopping, multiple-frequency-shift-keyed, spread-spectrum communication system using a nonprocessing communication satellite transponder. A large number of users are assumed to be hopping pseudo-randomly about the transponder passband in time synchronization and approximate frequency synchronization. The users are assumed to be free to hop independently, with the result that they occasionally interfere with one another. Formulations are presented that permit the level of the mutual interference to be assessed, thereby facilitating the selection of system parameters that will maximize the communication throughput of the system.

MR-675-A An Analysis of Collaborative Research Opportunities for the Army. C. Wong. 1998.

The Arroyo Center has developed a methodology to identify opportunities for the Army to use collaboration with industry to more effectively achieve its research and development goals. The framework prioritizes technologies by Army utility and by market breadth, and it allows superimposition of different management approaches. The author applies the framework to Army technologies and identifies those that are the most appropriate candidates for collaborative development with the commercial sector. Also presented is a budgetary analysis of recent and proposed Army R&D resource allocations. By integrating the budgetary analysis with the framework application, the author shows that more Army collaboration with industry in selected technologies will enhance the effective use of Army R&D funds.

MR-677-A/OSD Military Recruiting Outlook: Recent Trends in Enlistment Propensity and Conversion of Potential Enlisted Supply. B. R. Orvis, N. Sastry, L. L. McDonald. 1996.

This report describes recruiting trends through early 1995, focusing on changes in youth enlistment propensity and the Army's ability to "convert" the potential supply of recruits into actual enlistments. Using updated survey data and methods of analyzing propensity, it concludes that the potential supply of recruits remains higher in FY95 than it was during 1989, when recruiting results were good. However, the latest survey results indicate some downturn in youth interest in military service. When that downturn is coupled with the large increase in accession requirements during FY96 and FY97, the ratio of supply to demand for high-quality enlistees could fall short of its predrawdown levels. Furthermore, survey data show a drop in the rate at which potential high-quality recruits discuss military service with key "influencers" (such as family and friends) and fewer contacts between recruiters and high school students (perhaps due to cuts in numbers of recruiters, their reduced presence in high schools, or a shift in focus from current students to graduates). Taken together, these results suggest future difficulties in meeting accession goals, which should be countered by increases in recruiting resources such as advertising, educational benefits, and recruiters.

MR-709-A Prospects for Russian Military R&D. S. L. Leiter. 1996.

This report examines the Russian military's options for achieving weapons modernization and new weapons development through either a revitalized state military research and development (R&D) sector or a robust civil scientific and technical sector. It considers the likelihood that neither of these sectors will prove adequate to the military's needs in the near term, forcing Russia to turn to the West for military-technical assistance. By investigating trends in the Russian scientific community as a whole, including science funding, higher education, the brain drain, and the evolution of scientific organizations, it assesses long-term prospects for Russian military R&D.

MR-721-A Data Quality Problems in Army Logistics: Classification, Examples, and Solutions. L. A. Galway, C. H. Hanks. 1996.

Many new Army initiatives such as Velocity Management and Force XXI are based on the assumption that information will be a key asset for U.S. armed forces of the future. Much Army logistics data, however, are widely perceived to be of poor quality. In this report, the authors review the current literature on data quality, develop a three-way scheme for classifying data quality problems, and apply the classification to the analysis of an

important logistics data element, the End Item Code (EIC). The authors argue that the EIC has quality problems of all three types, and review the evidence and efforts of the Army to address each. The most fundamental problem is due to the deep gap between the retail organizations that create EIC data and the wholesale organizations that use it. The authors propose several strategies to bridge the gap in order to improve the quality of the EIC data. An appendix applies the data classification scheme to a number of other important logistics data elements exhibiting data-quality problems and reaches similar conclusions about their causes.

MR-726-RC Casualties and Consensus: The Historical Role of Casualties in Domestic Support for U.S. Military Operations. E. V. Larson. 1996.

It is often said that the Vietnam War taught us that the American public is no longer willing to tolerate American casualties in U.S. wars and military operations. There are also two contradictory corollaries: one that the first deaths in a conflict will spark demands for immediate withdrawal, the other that casualties lead to an inexorable demand for "escalation to victory." The truth is far more subtle and sensible. The simplest explanation consistent with the data is that public support for U.S. military operations and public tolerance for casualties are based upon a sensible weighing of benefits and costs that is influenced heavily by consensus (or its absence) among political leaders. When such agreement is missing, even low costs can erode public support for the intervention. In the end, most Americans do not want lives to be sacrificed for any but the most compelling and promising causes, and they rely on their leaders to illuminate just how compelling and promising these causes are.

MR-730-A Understanding and Reducing the Costs of FORSCOM Installations. J. G. Bolten, J. M. Halliday, E. G. Keating. 1996.

The Arroyo Center has been investigating alternative approaches to reducing the cost of base operations at FORSCOM installations. Researchers analyzed expenditure data from the eight major installations (Forts Bragg, Campbell, Carson, Drum, Hood, Lewis, Riley, and Stewart) and visited six of them to discuss with garrison personnel their reengineering efforts, contracting experience, the Installation XXI initiatives, and other aspects of base operations. The data indicate that for a variety of reasons, expenditures for base operations functions can differ widely across installations. Limitations of the Army financial accounting system make it difficult to draw specific conclusions about these expenditures without detailed analysis of data from each installation. Decentralized approaches to reengineering seem to hold some promise for reducing future operating costs, but it may be difficult for the Army to realize all potential savings in the long term. Proposals to create a hub/satellite structure or centralize functions should be examined carefully before implementation. The civilian pay cap to be applied in FY96 and the implementation of Integrated Sustainment Maintenance have the potential to create some problems if unit and installation incentives are not aligned with overall Army policy. Finally, although increased use of contracting has been proposed as an alternative to civilian employees, this will not solve all current problems. Contracting has advantages, but the A-76 (Commercial Activities) process must be simplified, and installation experience with contracts should be more widely disseminated. Moreover, contracting functions does not necessarily save money, although installations with major contracts are generally satisfied with contractor performance.

MR-733-A Algeria: The Next Fundamentalist State? G. E. Fuller. 1996.

This study is one of a series by the author on Islamic fundamentalism, or Islamism, in the Muslim world. This study is of particular policy interest because it deals with the prospect of a fundamentalist victory in Algeria, the largest and one of the most important Arab states. A fundamentalist takeover in Algeria will have major repercussions in the region. The author attempts to put such a takeover into perspective: what would it look like, and what would it mean for the West and the region? This problem is of intense interest not only to Washington but also to Western Europe, which would be the recipient of potential refugee flows and is already (and increasingly) dependent on Algerian natural gas. The author also looks at the Algerian case on a comparative basis: what does it tell us about the varieties of the broader international movement of political Islam?

MR-742-A Strategic Exposure: Proliferation Around the Mediterranean. I. O. Lesser, A. J. Tellis. 1996.

The proliferation of weapons of mass destruction—nuclear, chemical and biological—and the means for their delivery at ever longer ranges has emerged as a leading issue in the post-Cold War debate about international security and as a prominent concern of U.S. policymakers and Army planners. Nowhere are the effects of proliferation trends felt more keenly than around the Mediterranean, where the European and Middle Eastern security environments meet, and where NATO allies are increasingly exposed to the spillover effects of instability to the south. This analysis explores proliferation trends in North Africa and the Levant (the Eastern Mediterranean and its hinterlands), the motives of proliferators around the region, and the implications for European security and for U.S., NATO, and Army policy.

MR-760-A A Policymaker's Guide to Accrual Funding of Military Retirement. W. M. Hix, W. W. Taylor. 1997.

At the request of the Army Vice Chief of Staff, the Arroyo Center conducted an analysis of factors that drive personnel costs and ways to reduce future costs. A key focus of interest was the large sums of money required to fund future retirement obligations for military personnel.

Analysis identified two changes in retirement accrual calculations that would provide substantial savings to the Army and the Department of Defense (DoD). Such changes would tie service and DoD budgets more directly to their policy actions and encourage decisionmakers to explicitly consider future budgetary consequences of their personnel decisions. First, we recommended a change in retirement accrual calculations to recognize inter-service differences in retirement rates. Because the services differ sharply in the proportion of their members who reach retirement, recognizing these differences would result in lower charges to the Army, Navy, and Marine Corps, and increased charges by the Air Force. As a result, for example, the annual Army charge could decline by some $700 million per year. Second, we recommended that DoD be allowed to share in "actuarial gains" (and losses) in the Treasury fund established to amortize the unfunded liability for retirements before 1985. Such gains regularly occur, because the Treasury fund is adjusted each year for various changes in the liability amount. We argued that DoD should share in these gains or losses. Over the past 10 years, such gains have averaged some $29 billion per year, a portion of which should be credited to DoD.

MR-765-AF/A/OSD Not with a Bang But A Whimper: Western Europe Approaches the Third Millenium. R. A. Levine. 1996.

The current stability of Western Europe appears likely to continue but is by no means guaranteed. The probable stable future is neither grim nor inspiring, but it is preferable to the instability that could be brought about by gambling for a more inspiring outcome. The key to post-Cold-War security and stability lies in economics, and Western Europe needs faster economic growth and lower unemployment. Indeed, if the signs portend downturn rather than accelerated growth, internal instability may become a major problem for the European Union and some of its member states. Economics is also the key to eastward expansion of EU; the former Communist states are likely to become members only as their economies converge with those of the West. In the meantime, NATO may prove a more flexible organization for tying these states to the west and assuring their security. In general, however, Western Europe and the United States should be wary of damaging NATO by trying to improve it in the abstract. Continued U.S. participation in Europe is vital, as is taking care not to damage this relationship in the name of transitory moral or political objectives.

MR-773-A Army Medical Support for Peace Operations and Humanitarian Assistance. L. M. Davis, S. D. Hosek, M. G. Tate, M. Perry, G. Hepler, P. S. Steinberg. 1996.

The U.S. military is increasingly being called upon to provide medical support for U.S. forces, coalition forces, and civilian populations in "operations other than war"—a broad range of missions including peace operations, humanitarian assistance, disaster relief, and nation assistance, among others. This report focuses on lessons from recent operations in Somalia and the Balkans. It finds that such operations impose a broader range of demands for medical services than traditional combat scenarios, and they raise numerous difficult issues, e.g., "holes" that appear in the theater medical system, wide variations in medical assets and practices among coalition members, great variability in medical readiness among coalition forces, and both external and internal pressures to expand the U.S. medical mission. In addition, in these operations the medical mission often tends to be broader than just supporting the deploying force. Since such missions are increasingly frequent, the authors recommend that the Army enhance the flexibility and tailorability of its medical elements in order to accommodate the diversity of new missions it faces in OOTW and coalition environments, educate medical planners and AMEDD personnel about the variability and features of operations other than war, and become more proactively involved in the strategic planning process.

MR-780-A/DARPA Combat in Hell: A Consideration of Constrained Urban Warfare. R. W. Glenn. 1996.

Armed forces are ever more likely to fight in cities as the world becomes increasingly urbanized. Accordingly, public and moral concerns about the costs of war borne by noncombatants increase as well. This report is a study of urban warfare and its challenges for U.S. armed forces constrained by having to minimize noncombatant casualties and collateral damage. America's armed forces are likely to have to confront the hell of urban combat. They have the potential to do so successfully. However, this environment's challenging character is unalterable; it will consume any force that fights unprepared. This study, based on an in-depth literature search and scores of interviews, has three primary objectives: (1) Describe the conditions confronting a ground force fighting under the constraints of minimizing noncombatant casualties and collateral damage, along with the difficulties of fighting under such conditions in urban areas; (2) identify U.S. armed forces' current capabilities and ongoing efforts to enhance them; and (3) determine current shortfalls and present potential remedies for identified vulnerabilities. Consideration of such solutions will include analysis of feasible changes in doctrine, training, and technologies that would give regular U.S. forces the capability to successfully perform constrained urban operations.

MR-818-OSD/A Test Score Trends and Military Recruiting: Estimates from the NELS. M. R. Kilburn, L. M. Hanser, J. A. Klerman. 1998.

This report estimates the determinants of individual enlistment decisions using the 1992 and 1994 waves of the National Educational Longitudinal Survey (NELS). The authors impute AFQT scores for NELS respondents using test scores reported in the 1992 NELS, test score trends from the 1978-1992 National Assessment of Educational Progress (NAEP), and the sample in the 1980 National Longitudinal Survey of Youth (NLSY) that was used to norm the AFQT. Percentile scores on the NELS tests are

equated to percentile scores on the AFQT in the NLSY with an adjustment to reflect test score trends observed in the NAEP over the period between 1980 and 1992. In addition to imputing AFQT scores for NELS respondents, the authors examine test score trends between 1980 and 1992 to draw implications for recruiting policy. There appears to be no justification for any concerns that a rising share of minorities in the youth population will result in a decline in the potential supply of youth. Even though minorities in the early 1990s continued to score lower than average on the AFQT, the growth in their population share was outweighed by their greater-than-average test score growth during the 1980s and early 1990s. The net result of these countervailing trends was that a larger fraction of minorities was estimated to be high-quality potential recruits and that the share of the entire senior population scoring in that range was largely unchanged.

MR-825-A Interagency Coordination in Military Operations Other Than War: Implications for the U.S. Army. J. M. Taw, M. Agmon, L. Davis. 1997.

The Arroyo Center is researching ways for the U.S. Army to maximize its effectiveness and efficiency in interagency military operations other than war (MOOTW). Army and civilian efforts to provide humanitarian and nation assistance in MOOTW are coinciding more and more frequently. The Army must identify how it can maximize its comparative advantage in this environment despite internal and external pressures to assume tasks that may fall more logically to civilian U.S. government agencies or even to nongovernmental organizations or UN agencies. The Army must help find a balance at all levels—policy, operational, and tactical—in which it contributes to interagency MOOTW without either usurping civilian agencies' roles, on the one hand, or being asked to assume too many of their responsibilities, on the other. The Army must start with a clear sense of which interagency problems lie outside its sphere of influence, and which lie within it. Among the steps the Army can take to enhance its efforts in interagency MOOTW are the following: more input by the Chief of Staff of the Army at the policy end; more education of soldiers and civilians about their respective objectives, methods, and capabilities; closer linkages up and down the civilian and Army chains of command; and more Army input into doctrine guiding interagency coordination, including the structure and manning of civil-military operations centers.

MR-829-A ISM-X Evaluation and Policy Implications. M. K. Brauner, J. R. Bondanella, J. G. Bolten, L. A. Galway, E. M. Pint, E. H. Ondaatje, J. M. Sollinger. 1997.

This document is the final report on RAND's evaluation of the Army's expanded Integrated Sustainment Maintenance (ISM-X) demonstration. The report is divided into three major parts. First, it presents statistical results on the measurement and conduct of the demonstration and in some cases compares those results to performance before the demonstration. The discussion then turns to the economic issues involved in assessing the costs and benefits of ISM and ISM's interaction with the Army's financial systems. Finally, the report draws some inferences about the Army's ability to support contingency operations under an ISM-based logistics system. An appendix discusses the participation or potential participation of the Reserve Components. The introductory section of the report presents the history of ISM and sets the context for the evaluation results. The concluding section contains RAND's cautions for ISM implementation. Although ISM has accomplished some significant goals, some remaining problems will keep it from achieving its full potential unless they are resolved. Specifically requiring attention are the financial policies and incentives surrounding logistics operations, the management of the ISM program, support to contingency operations, and long-term decisions about the logistics infrastructure.

MR-830-A Performing Collaborative R&D with Nontraditional Military Suppliers. K. Horn, E. Axelband, I. Chang, P. Steinberg, C. Wong, H. Yee. 1997.

This report discusses what the Army needs to do to attract more nontraditional military suppliers (NTMSs) and what specific Army organizations and associated technologies are best suited for a pilot program designed to attract NTMSs. We find that there are significant opportunities for Army collaborations with NTMSs, but that the Army has had limited success attracting them using such traditional options as contracts, CRDAs, and PLAs. To attract NTMSs, the Army must eliminate many cumbersome regulations—something that can be accomplished using Cooperative Agreements and Other Transactions—but must also understand and identify the relevance of the Army's research in terms of the commercial markets. The Army can do three things to significantly improve its chances of successful collaborations with NTMSs: align technology objectives, produce business plans, and plan for success. Finally, an assessment shows five promising areas for a pilot to attract NTMSs—Natick RDEC (food, clothing, or biotechnology); STRICOM (advanced simulators); DISC4 (expert systems); NAC (vehicle technologies); and ARL (information warfare).

MR-844-A Resources, Costs, and Efficiency of Training in the Total Army School System. M. G. Shanley, J. D. Winkler, P. Steinberg. 1997.

This report analyzes the resource use and efficiency of the new prototype school system established by the Reserve Components (RC) in the southeast section of the United States (Region C). The assessment of outcomes in FY95 (the execution year of the prototype) is based on data collected in both FY94 (the baseline year) and FY95 in Region C and Region E, a comparison region in the midwest. The document also discusses ways to further

improve resource use and efficiency in the future—primarily by more fully utilizing school system capacity. Because the school system is currently falling far short of meeting RC training demand, the authors focus on more effectively using current school resources rather than on achieving manpower or dollar savings. However, if training requirements decrease in the future, the results of this research could be applied to achieve resource savings. This report is part of a larger effort by the RAND Arroyo Center to analyze the performance and efficiency of the RC school system.

MR-845-OSD/A Encouraging Recruiter Achievement: A Recent History of Recruiter Incentive Programs. C. Oken, B. J. Asch. 1997.

Planners and policymakers concerned with recruiting have seen indications of increased difficulty in meeting recruiting goals. To examine this potential problem, the report reviews, in considerable detail, service by service, the evolution of recruiter incentive plans over the last 15 to 20 years, describing how these plans have changed over time. There is a great deal of variation in incentive plans across services, possibly due to such causes as service culture or changes associated with the drawdown. This variety suggests that the services have been struggling over time to find the best incentive plans to fit their needs.

MR-846-A Company Performance at the National Training Center: Battle Planning and Execution. B. W. Hallmark, J. C. Crowley. 1997.

Arroyo Center researchers investigated company-level command and control (C2) factors related to effective direct fire control at the Army's National Training Center (NTC). This study analyzes possible problems with company-level direct fire control, terrain and enemy analysis, and command and control planning and preparation, explores how these problems affect combat effectiveness at NTC, and discusses implications for current training methods and policies. The analysis led to four major conclusions. First, companies can perform basic planning activities adequately but not complex ones. Second, companies plan better than they execute. Third, they maneuver better than they control direct fires. Finally, overall execution, particularly direct fire control, is generally inadequate.

MR-847-OSD/A Recent Recruiting Trends and Their Implications for Models of Enlistment Supply. M. P. Murray, L. L. McDonald. 1999.

The authors estimate an econometric model of high-quality enlistment supply using geographically disaggregated data from two periods, FY83–87 and FY90–93. They find that econometric models based on data from the earlier period do not predict the recruiting difficulties reported by the military in the 1990s. This conforms to a preliminary assessment provided by Asch and Orvis (MR-549-A/OSD, 1994). The authors also find that econometric models estimated with the 1990s data give altered counsel about the effects of at least some policy variables, most notably the number of recruiters.

MR-850-A/RC Restructuring Military Education and Training: Lessons from RAND Research. J. D. Winkler, P. S. Steinberg. 1997.

As the military becomes smaller and defense budgets shrink, pressures grow to justify and reduce training costs that total billions of dollars a year. But because maintaining preparedness remains a high priority, the military services cannot afford wholesale or indiscriminate reductions in training activities and resources. Thus, the problem the military faces is how to reorganize its training functions to reduce costs while preserving effectiveness. This report aims to identify promising directions for restructuring programs of military education and training to make them more effective, affordable, and efficient. It summarizes results and insights from a number of RAND studies that assessed alternative concepts for restructuring military training programs within and across the military services. The authors identify tools and provide insights for making training more efficient and affordable. They have drawn their findings largely from studies that address individual military education and training, which provides soldiers with the specialized skills and knowledge they need to perform their functions as members of military organizations. However, the authors also address the implications of this research for other types of training (e.g., collective training in units) and for functions related to individual training that are customarily not analyzed (e.g., training development and support).

MR-852-A Army Forces for Operations Other Than War. R. E. Sortor. 1997.

National military strategy has changed the focus of military planning to include a broader range of missions, which span the spectrum from major regional contingencies (MRCs) to operations other than war (OOTW). This leads to a key planning question: How should the active component and the reserve components be structured to meet the Army's evolving requirements? The first portion of this research was documented in MR-545-A This document describes results from the second portion of the project, to determine the Army forces required for OOTW and study how these requirements might affect the Army's ability to execute an MRC with the planned forces. The author's analysis indicates that for the most part, the present force is adequate in unit type and number; OOTW requirements add only very slightly to some of the shortfalls in the Army-desired MRC capability—shortfalls that already exist in the absence of an OOTW. Results do highlight the need to consider OOTW effects beyond the units actually deployed to an operation. Cross-leveling, tailoring, and deployment of partial units all place added demands on the Army's ability to manage the readiness and availability of the force. These OOTW demands may require accommodation in terms of unit structure and manning in order to have a

sufficiently robust capability. The reserve components can play a greater role in this regard, although probably not through increased direct participation in OOTW contingencies.

MR-853-A Anticipating Ethnic Conflict. A. J. Tellis, T. S. Szayna, J. A. Winnefeld. 1997.

This report provides a practical tool—a guidebook and a methodology to follow—to help intelligence analysts determine the long-term potential for communitarian and ethnic conflict. It is based on a conceptual model of group conflict. The three-stage model traces the development of ethnic and communitarian strife, beginning with the conditions that may lead to the formation of an ethnic group, then the group's mobilization for political action, and ultimately its competition with the state. The main body of the handbook is formatted as a series of questions and guidelines for the analyst to consider while preparing an assessment. An appendix provides a full theoretical explanation of the model. As its goal is to provide a tool to help intelligence analysts predict whether a competition between an ethnic group and the state will end in violence, the model supplies a series of matrices to help identify the conditions that may lead to ethnic and communitarian strife.

MR-863-A The "Virtual Corporation" and Army Organization. F. Fukuyama, A. Shulsky. 1997.

The authors examine how the organizational structure of commercial corporations has changed over the past 10-15 years, in order to understand what lessons from that experience might be applied to the U.S. Army. Many of these changes have been greatly facilitated by advances in information technology, and part of the project's goal was to discover how the ongoing information revolution might make possible organizational innovations. The authors argue that the principles of flat organization and decentralized leadership are already present to a degree in Army doctrine, but in practice the Army tends to be excessively hierarchical. The problem is particularly severe in the TDA Army, as well as in the TO&E Army under peacetime conditions. The report suggests a number of ways to minimize the effects of excessive command hierarchy.

MR-910-A Time and Resources Required for Post-Mobilization Training of AC/ARNG Integrated Heavy Divisions. T. F. Lippiatt, J. C. Crowley, J. Sollinger. 1998.

This report analyzes the postmobilization training process for integrated divisions composed of elements of the ARNG and the Active Component. It considers two of three concepts the Army proposed. One organized three enhanced separate ARNG brigades in such a way that they could deploy as a standard Army of Excellence division or as three separate brigades. Under the second concept, the unit could deploy only as a standard division. The study analyzed three ways of carrying out the postmobilization training: (1) training three brigade combat teams in parallel at three sites, (2) conducting all brigade combat team and battalion task force maneuver training at Fort Irwin, and (2) operating two division sites. The analysis concludes that it would take from 132 to 239 days to produce the first division and from 217 to 239 days to produce the second. In addition, between 300 and 400 additional trainers are required beyond what are already allocated for the pre- and postmobilization training of the enhanced heavy brigades. The study assesses the three options from three perspectives: force generation, training quality, and resources. Any of the three approaches produce trained divisions but each poses different risks and tradeoffs, which the report analyzes in detail.

MR-921-A Meeting Peace Operations' Requirements while Maintaining MTW Readiness. J. M. Taw, D. Persselin, M. Leed. 1998.

Peace operations (POs) are arguably the military operations other than war most likely to stress the U.S. Army's ability to maintain combat readiness. POs require: a higher ratio of combat support/combat service support units and special operations forces relative to combat arms units than do major theater wars (MTWs); smaller, more tailored deployments; training for some new tasks and, more important, for a more restrictive and sensitive operational environment; and readier access to—and more of—some kinds of equipment (such as crowd and riot-control gear, nonlethal weapons, and vehicles). At a time when the Army is shrinking, changing its posture, and participating in a rising number of both exercises and operational deployments, its challenge is to both maintain MTW readiness (its primary mission) and meet the very different requirements of POs. As long as MTWs remain the national priority—and thus the Army's—the Army can make some marginal changes to force structure, training, and doctrine that will help improve PO performance while also mitigating the effects of PO deployments on MTW readiness. If POs become a higher priority, and resources remain constrained, the Army will have to trade off some MTW capabilities to better meet PO requirements. These challenges must also be viewed in light of existing Army problems (such as maintaining units at levels below normal strength and overestimating the readiness of the reserve component), which transcend POs but are severely exacerbated by PO deployments.

MR-929-A Microworld Simulations for Command and Control Training of Theater Logistics and Support Staffs: A Curriculum Strategy. J. R. Bondanella, M. W. Lewis, P. S. Steinberg, G. S. Park, D. G. Levy, E. Ettedgui, D. M. Oaks, J. M. Sollinger, J. D. Winkler, J. M. Halliday, S. Way-Smith. 1999.

This report discusses changes in training structure, content, and methods, with the focus on developing training for CSS staffs operating as staffs, not for individual training. The focus is on large unit staffs: corps and echelons above corps headquarters and support

commands. The document discusses shortcomings of the current approach to CSS staff training, and then proposes a process-oriented approach. It illustrates how microworld models can be used to train CSS processes. It then goes on to describe how pilot testing of prototype models indicates that this approach is feasible for large unit staffs. It concludes with a proposed training strategy that the authors believe is more appropriate and useful for meeting the challenges posed to the Army by personnel turbulence, split-based operations, increased reliance on information, and decreased training resources. The authors believe this approach has applications beyond the CSS training environment. They argue that the microworld models in a carefully designed training strategy are appropriate to any business that needs to train staff under distributed conditions in uncertain environments and to avoid time- and resource-intensive costs of bringing staff together for a large game in a central location.

MR-930-A Assessment of Crusader: The Army's Next Self-Propelled Howitzer and Resupply Vehicle. J. Matsumura, R. Steeb, J. Gordon. 1998.

This research explores the utility of the Crusader system—a next-generation self-propelled howitzer and resupply vehicle—to the future of the U.S. Army, including both the near-term Army XXI and the farther-term Army After Next. Specific questions were asked about Crusader's ability to provide firepower on the future battlefield and to serve as a major technology "carrier" into the Army-After-Next era. The report answers these questions and addresses other issues that may surface in considering the relative need for a state-of-the-art, self-propelled howitzer in light of other Army interests.

MR-934-A Improving Army Planning, Programming, Budgeting, and Execution System (PPBS): The Programming Phase. L. Lewis, R. A. Brown, J. Schrader. 1999.

As part of a special assistance activity for the Director of the U.S. Army's Program Analysis and Evaluation Directorate, the Arroyo Center participated in the creation of a new program development process and methodology. The principal objective in this work was to improve the Army's Program Objective Memorandum development process. The improvements were designed to (1) enhance the Army's ability to view the totality of its resources, (2) improve its resource-decision process, and (3) justify those choices within the Army and to the external community, including the Office of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Congress.

MR-938-A Personnel Turbulence: The Policy Determinants of Permanent Change of Station Moves. W. M. Hix, J. J. Shukiar, J. M. Hanley, R. J. Kaplan, J. H. Kawata, G. N. Marshall, P. J. Stan. 1998.

The movement of soldiers between permanent duty stations in the future will remain as prevalent as it was before the downsizing that followed the collapse of the Soviet Union. Although the Army has greatly reduced its European strengths, the rate of permanent change of station moves continues to be driven by (1) the relatively short tour lengths and only slightly diminished force size in Korea and (2) the average length of service for all personnel. Moves of soldiers to and from overseas stations, together with moves of new soldiers into and departing soldiers out of the Army, account for 90 percent of all permanent change of station moves. To substantially reduce movement rates, the proportion of the force serving overseas would have to be reduced, or lengths of service would have to be dramatically increased. The first of these policy changes lies outside the Army's authority to change; any savings associated with the second would be offset by substantial incremental costs to provide the financial incentives for soldiers to serve longer.

MR-944-OSD/A Enlistment Decisions in the 1990s: Evidence from Individual-Level Data. M. R. Kilburn, J. A. Klerman. 1999.

This work updates previous estimates of individual enlistment models, investigating the relationship between family, individual, local labor market, and other background characteristics and the decision to enlist. The study makes three primary innovations to earlier models. First, it uses data from the early 1990s, while the most recent estimates were from the early 1980s. The data report the enlistment behavior of a cohort of individuals from the National Educational Longitudinal Study (NELS) who were high school seniors in 1992. In general, the authors find that their coefficient estimates are similar to those estimated by earlier models, while the mean levels of the explanatory variables are more often significantly different from those in earlier data. Second, the authors explore the utility of including some additional variables in the model that are more relevant to the 1990s or were not available in early data. These include measures of immigrant status, criminal behavior, drug use, in-state college tuition, and whether parents were in the military. The research finds that immigrant status, criminal behavior, and having parents in the military are significant determinants of individual enlistment decisions. Third, the authors estimate the individual enlistment decision as a three-choice decision-whether to enlist, enroll in college, or work after high school graduation-in contrast to earlier studies, which modeled the enlistment decisions as a two-way choice of whether to enlist or not. The study concludes that the trivariate-choice model dominates the bivariate model because it produces more significant coefficient estimates and yields more insights into the reasons that individuals enlist rather than choosing alternative activities.

MR-960-A Emerging Commercial Mobile Wireless Technology and Standards: Suitable for the Army? P. M. Feldman. 1998.

The U.S. Army, as well as the other services, is moving in the direction of greater use of commercial technology and

standards. The principal motivation for this change is the desire to reduce costs. However, increased interoperability is another potential benefit. This report evaluates commercial wireless communications technology, including components and subsystems, physical layer standards (waveforms and signal processing), protocol standards, and products and services. We attempt to assess the suitability of these commercial technologies for Army tactical applications and to suggest the appropriate mix of commercial, military-unique, and military variants of commercial systems for use on the digital battlefield. The author recommends specific Army research and development areas where progress is needed in order to address voids between military requirements and currently available and emerging technology.

MR-988-A The 1997 Army After Next Winter Wargame: Assessment and Issues. M. D. Millot, W. L. Perry. 1998.

Army After Next (AAN) was designed to link Force XXI to a long-term vision of the Army and to ensure that this vision informs Army research and development efforts. As part of AAN, TRADOC is conducting a series of high-level wargames to identify and explore issues affecting the development of the Army in the next century. The Arroyo Center is assisting TRADOC by providing a framework to evaluate AAN, identifying issues to explore in the wargames, helping to manage the wargame data collection, and assessing game results. This report addresses the design of the Winter Wargame, suggests improvements for its execution, and discusses the role of the wargame process in a broader AAN analysis.

MR-992-A Staffing Army ROTC at Colleges and Universities: Alternatives for Reducing the Use of Active-Duty Soldiers. C. A. Goldman, B. R. Orvis, M. G. Mattock, D. A. Smith. 1999.

The increased tempo and range of military operations coupled with reduced manning levels are exerting pressure on the Army to optimally use its active-duty soldiers. Consequently, the Army is seeking opportunities to fill positions now occupied by active-duty soldiers with other personnel. Specifically, Umbrella Issue 41 of the Army-wide Institutional/TDA Redesign Study called for the design and testing of staffing alternatives for the Senior Reserve Officer Training Corps (SROTC) program using a combination of Active Component, Reserve Component, or former military personnel. In support of this requirement the Arroyo Center was asked to develop staffing alternatives and design a test of their effectiveness. This report discusses alternatives to current SROTC battalion staffing in which many active-duty soldiers performing teaching or training functions would be replaced by reservists or by contracted civilians with former military service. Also, civilians would be contracted to help cover administrative and logistics functions now performed by active-duty soldiers. The authors recommend testing two alternative staffing plans, each over a period of two years. One plan focuses on former military personnel, the other on reservists.

MR-994-A The Zapatista "Social Netwar" in Mexico. D. Ronfeldt, J. Arquilla, G. E. Fuller, M. Fuller. 1998.

The information revolution is leading to the rise of network forms of organization in which small, previously isolated groups can communicate, link up, and conduct coordinated joint actions as never before. This in turn is leading to a new mode of conflict—"netwar"—in which the protagonists depend on using network forms of organization, doctrine, strategy, and technology. Many actors across the spectrum of conflict—from terrorists, guerrillas, and criminals who pose security threats, to social activists who may not—are developing netwar designs and capabilities. The Zapatista movement in Mexico is a seminal case of this. In January 1994, a guerrilla-like insurgency in Chiapas by the Zapatista National Liberation Army (EZLN), and the Mexican government's response to it, aroused a multitude of civil-society activists associated with human-rights, indigenous-rights, and other types of nongovernmental organizations (NGOs) to "swarm"—electronically as well as physically—from the United States, Canada, and elsewhere into Mexico City and Chiapas. There, they linked with Mexican NGOs to voice solidarity with the EZLN's demands and to press for nonviolent change. Thus, what began as a violent insurgency in an isolated region mutated into a nonviolent though no less disruptive "social netwar" that engaged the attention of activists from far and wide and had nationwide and foreign repercussions for Mexico. This study examines the rise of this social netwar, the information-age behaviors that characterize it (e.g., extensive use of the Internet), its effects on the Mexican military, its implications for Mexico's stability, and its implications for the future occurrence of social netwars elsewhere around the world.

MR-995-A Futures Intelligence: Assessing Intelligence Support to Three Army Long-Range Planning Communities. J. E. Peters, E. V. Larson, J. A. Dewar. 1998.

This report examines the intelligence needs of three groups of Army long-range planners—strategic planners, force developers, and acquisition—and considers the potential of Army intelligence to satisfy these needs. Data collected from interviews, workshops, and case studies discovered disparities in expectations and capabilities that collectively constitute cultural differences between intelligence officers and planners, and that make it difficult for Army intelligence to render fully satisfactory support to long-range planners. The authors recommend specific actions by the Office of the Deputy Chief of Staff for Intelligence to address Army intelligence's main shortcomings in supporting long-range planning. Sustained interaction of Army intelligence experts with its customers will improve the quality of support. Communications technology plays a role here, but the more important task is to make sure that Army intelligence

continues to develop high-quality experts with sound reputations among Army planners and in the intelligence field.

MR-997-A Use of Public-Private Partnerships to Meet Future Army Needs. I. Y. Chang, S. E. Galing, C. Wong, H. Yee, E. I. Axelband, M. Onesi, K. P. Horn. 1999.

The Arroyo Center was asked to assist Army Materiel Command by creating a strategy for managing the development of advanced technologies, with special attention to the changing future environment for research and development. In previous phases of this project, the authors showed that the Army has significant opportunities to do collaborative research with industry. Moreover, they documented new concepts the Army can use to implement a collaborative policy and showed how effective those concepts would be in attracting nontraditional suppliers. In this report, the authors expand on the notion of a collaborative research strategy and discuss the utility of public-private partnerships (PPPs) in the management and development of Army infrastructure, intellectual property, and financial arrangements. They discuss how PPPs can benefit the Army through opportunities to leverage assets, reduce costs, create new assets or capabilities, be an alternative approach to Base Realignment and Closure Actions, and generate revenue. The federal government has begun to recognize the mutually beneficial returns of such partnerships. For the past two decades, legislative changes and actions by federal agencies have together created an environment more conducive to PPPs. Moreover, the continued growth of PPPs at the local government level will spur federal bodies such as the Army to engage in more PPPs in the future. As the use of PPPs grows, more innovation is also likely in order to accommodate the variety of situations in which PPPs will be applied. Some innovations will be extensions of existing programs, others will be borrowed from the academic or commercial worlds, and some will be completely new concepts. As PPP innovations emerge, the Army will have to evaluate new concepts with respect to feasibility and the benefits each concept is likely to bring. These evaluations can be combined to yield a strategic approach to expanding the Army's use of PPPs.

MR-1000-OSD/A/AF Western Europe 1979-2009: A View from the United States. R. A. Levine. 1998.

As the start of the European Monetary Union (EMU) approaches, Western Europe may be heading for troubles that could extend to the United States. The problem lies in the West European political economy. The imposition of highly restrictive fiscal and monetary criteria laid down in Maastricht in 1991 as requirements for membership in the EMU, coupled with economic impacts brought about by East German reconstruction, has resulted in high unemployment and other harsh realities. If Maastricht's rigid macroeconomic constraints are relaxed—if EMU balances its stress on inflation control and fiscal rectitude with equal emphasis on employment and growth—then rising unemployment may be reversed in the short run and conditions can be set for long-run improvement. If not, and if unemployment remains near or above 12 percent, then the worst is yet to come. What will happen to EMU will depend on the futures of the four key West European political economies: Germany, France, Italy, and the United Kingdom. The author derives four scenarios, ranging from a worst case to "a way out."

MR-1007-A Marching Under Darkening Skies: The American Military and the Impending Urban Operations Threat—A Status Check. R. Glenn. 1998.

Recent history provides evidence that U.S. participation in future urban military operations is inevitable; past events reflect that these operations are extraordinary in their demands on ground and air forces. This report draws on a review of relevant literature, service doctrine, training, and emerging technologies to assess U.S. military preparedness to undertake military operations on urbanized terrain (MOUT). It offers observations and preliminary recommendations addressing identified shortfalls. These recommendations include: (1) The four services should adopt Marine Corps Warfighting Publication 3-35.3 as the initial foundation for a more comprehensive doctrine on joint MOUT; (2) the U.S. Army Center for Lessons Learned should publish a MOUT lessons learned bulletin; (3) include realistic consideration of operations in urban environments during service and joint exercises; (4) include MOUT considerations in the development of new technologies; (5) provide cadre at urban operations training sites; and (6) provide for complete instrumentation of selected Combat Training Center MOUT facilities.

MR-1010-A Policy Issues and the McGregor Range Renewal. D. Rubenson, R. Everson, J. Munoz, R. Weissler. 1998.

Six major military ranges comprising roughly 30 percent of the Department of Defense's lands will revert to the public domain in 2001 unless Congress reauthorizes their use for military purposes. This report evaluates the military rationale for retaining the 600,000-acre McGregor Range on Fort Bliss within the military system. The report is organized around arguments that have suggested that the McGregor Range should be returned to the public domain: (1) the low military utilization on McGregor, (2) doubts about the military role of McGregor, (3) the thought by some that McGregor activities could be easily transferred to the nearby White Sands Missile Range, and (4) important nonmilitary uses of McGregor. The authors find that low utilization numbers are an artifact of Army range record keeping. While moderately utilized, McGregor is a critical factor in ensuring that Fort Bliss can perform its role as the nation's center for air defense. The authors also find that there are no obstacles to conducting the nonmilitary uses on McGregor in conjunction with existing military missions. White Sands does have sufficient land and airspace to accommodate the McGregor mission, but transferring activities could only occur in the context of a national evaluation of military

basing options and policy. The study concludes that there would be adverse military impacts in returning McGregor to the public domain, but few positive changes in the level of nonmilitary use.

MR-1012-A Consolidating Active and Reserve Component Training Infrastructure. J. F. Schank, J. D. Winkler, M. M. Mattock, M. G. Shanley, J. C. Crowley, L. L. McDonald, R. A. Madison. 1999.

As part of a research project entitled "Evolution of the Total Army School System," this report examines ways to consolidate training infrastructure and augment capabilities across components to gain efficiency and achieve economies of scale in conducting individual training of Active Component (AC) and Reserve Component (RC) soldiers. Using an optimization model, the researchers examined three options in the area of maintenance-related training, focusing on RC Regional Training Sites-Maintenance (RTS-Ms) and the AC proponent schools offering maintenance courses. Results suggest that permitting AC and RC students to take courses at the nearest accredited school (AC school or RTS-M) has both economic and morale/cultural benefits. The former include reductions in travel, per diem, and potential instructor costs. The latter include reductions in the time AC students spend away from their homes and units, lower training workloads for AC instructors, and more interaction, potentially building trust and confidence across components. Such interaction could also provide benefits in functional areas beyond maintenance, such as combat service support. Based on the analyses, the researchers recommend a pilot test to better understand the options and policy implications.

MR-1023-A Issues Raised During the Army After Next Spring Wargame. W. L. Perry, B. R. Pirnie, J. Gordon VI. 1999.

The Army After Next (AAN) wargames provide a structured forum for a discussion of national security issues associated with the nature of warfare in the early-to-mid 21st century. This report summarizes issues generated during the AAN Spring Wargame 1998. The wargame was set in 2021. The major game activity involved an attack by Red on the states on the south shore of the Persian Gulf. The United States was also involved in a multinational peacekeeping operation in Indonesia. In addition, continuing border conflict between India and Pakistan escalated dangerously during the game, eventually resulting in nuclear weapon use. These three separate events were designed to examine the role of AAN forces in global conflicts. Five dominant themes cut across the twelve issues identified in this study: rapid deployment into theater, asymmetric responses, urban warfare, homeland defense, and information operations.

MR-1040-A Preparing for Korean Unification: Scenarios and Implications. J. D. Pollack, C. M. Lee. 1999.

This study examines four alternative scenarios that would result in the unificatio authors describe the defining characteristics of each scenario, potential indicators that would predict specific outcomes, some possible variations in paths to unification, and some operational implications for the U.S. Army under different conditions and circumstances. The four scenarios (peaceful unification, collapse and absorption, unification through armed conflict, and disequilibrium and external intervention) highlight both the increasing vulnerabilities of the North Korean state and the substantial uncertainties that attach to each outcome and to the potential U.S. policy responses. These considerations impose major conceptual, policy, and operational challenges both in the near and middle term and in the postunification peninsular security environment. Each warrants an enhanced analysis and assessment effort, lest U.S. and ROK policymakers find themselves ill prepared for major challenges to alliance management and to the U.S. Army role in a future crisis.

MR-1064-A Does the Army Have a National Land Use Strategy? D. Rubenson, R. Weissler, C. Wong, R. Everson. 1999.

The Army and the Department of Defense (DoD) have a long-term need to access land for training and testing. Both have been criticized for failing to determine their overall land needs, and for pursuing land expansions without a rational strategy. Critics charge that the military is involved in "land-grabs" driven by the inability to share resources across organizational boundaries within DoD. This study examines the physical and organizational boundaries of the DoD and Army land base, and it uses the Army as a case study of how land requirements are determined. The authors conclude that physical—not organizational—boundaries, along with advances in weapon systems, create the need for additional land. Physical boundaries turn the issue of overall land needs into a meaningless concept. However, organizational and institutional boundaries prevent DoD and the Army from explaining this and forming a clear statement of the overall approach to determining land requirements. The authors recommend that the Army make its implicit strategy explicit, and they provide recommendations for more efficient use of the land base between major command and services.

MR-1069-A Allocating Scholarships for Army ROTC. C. A. Goldman, M. G. Mattock. 1999.

In the face of rising tuition costs and the increased importance of scholarships to meeting its commission mission, the Army designed a new scholarship program, known as the tiered scholarship program because it offered four different scholarship values (called tiers). Under the new program, enrollments at public colleges increased modestly and the Army controlled the total scholarship cost. But as feared, many fewer of the nation's most academically able students enrolled in ROTC, and the programs at the nation's most prestigious private colleges and universities were facing the prospect of closure.

Based on these findings, the authors recommended and the Army implemented a high-value scholarship targeted to some prestigious private colleges. The study also analyzes several complete scholarship programs to replace the tiered scholarships. The analysis supports plans that continue to offer high-value scholarships at some prestigious private schools, while offering lower values at other schools. Although it would entail some significant tradeoffs, the authors have also presented a plan that would offer greater values to in-state students at public schools-a large potential market, especially if tuition increases in the private schools do not abate in the decade ahead. These offers would require congressional approval because the law currently prohibits the use of scholarships for room and board, which constitute the largest portion of these in-state students' expenses to attend college.

DOCUMENTED BRIEFINGS

DB-104-A Weapon System Sustainment Management: A Concept for Revolutionizing the Army Logistics System. J. Dumond, R. Eden, J. R. Folkeson. 1994.

This documented briefing advocates a comprehensive concept for managing the Army and DoD logistics systems—Weapon System Sustainment Management (WSSM)—and illustrates the concept by drawing on several RAND logistics studies. To meet future threats, the logistics system must become much leaner, more flexible, and more responsive. The most successful commercial firms have developed these same characteristics by adapting a new management paradigm. WSSM applies similar management concepts to improve the Army logistics system. WSSM identifies three strategies that can help the logistics system achieve improved performance at lower cost. The first strategy is to focus the entire system on meeting the needs of the "customer" (i.e., the operational commander). The second strategy is to design and redesign weapon systems to be more supportable. The third strategy calls for changes in the structure of the logistics system so that it depends less on mass and more on the speed and accuracy of its processes (repair, distribution, etc.). WSSM integrates much RAND logistics research conducted over the past several decades and is influencing Army and DoD policymakers through projects for several sponsors.

DB-106-AF/A Future Gulf Dynamics and U.S. Security. B. Nardulli, M. Agmon, T. W. Karasik, J. A. Kechichian, M. E. Morris, N. B. Schahgaldian, L. Arghavan. 1994.

This documented briefing examines the post-war strategic environment in the greater Gulf region and its implications for future U.S. security planning. The report argues that Iraq's invasion of Kuwait, the coalition war against Iraq, and the Soviet Union's collapse have unleashed political, economic, and social forces that are challenging the foundations of power in the region, and that given this environment, regional actors will be unlikely to form even a general consensus on how to approach future regional security problems and will not be able to create formal security structures. While the United States has successfully cultivated and expanded long-term security links in the region, the future prognosis is one of regional deterioration in which the U.S. military—in part because of this success—may be increasingly drawn into the web of Gulf dynamics. The report suggests some broad alternatives for addressing regional security challenges, but argues that policymakers cannot avoid distinct trade-offs among the alternatives and that "optimizing" among the trade-offs to avoid facing tough decisions will result in contradictory and potentially dangerous outcomes.

DB-107-A Future Army Long-Range Fires: Bringing New Capability to the Battlefield (U). J. Matsumura, E. Cardenas, K. P. Horn, E. McDonald. 1994. SECRET NOFORN WNINTEL LIMITED NO DTIC INTEL

(U) This documented briefing explores the application for future U.S. Army long-range or "deep fires" artillery systems. The study finds that the new attributes of long-range systems can be used in a variety of different ways-often offering substantially greater flexibility on a future battlefield. In addition, the study finds that in concept, deep fires is highly consistent with other aspects of current military planning for the future. The study recommends conducting new analyses showing the added benefit of having these systems available early in a conflict, considering "austere" scenarios as a background for future analysis, exploring the applicability of the smart dispense capability of TSSAM, and continuing to consider other emerging munitions concepts as possibilities for incorporation into the long-range delivery vehicle. The report concludes by recommending a further investigation of the utility of Army deep fires and Air Force tactical strikes and exploration of various threats and appropriate ways to allocate such weapon systems to optimize their effectiveness in the joint operations arena.

DB-111-A Early Entry Forces: An Annotated Briefing on the Question of New and Nonconventional Threats. M. Eisenstein. 1995.

Enemy forces using advanced weapons and weapons of mass destruction would pose serious concerns for an Early Entry Force (EEF) operation. Of specific concern is the use of theater ballistic missiles and chemical weapons against the EEF directly and against an air base that supplies its air defenses. The documented briefing explores what the EEF should bring with it in the way of active and passive defenses to meet these threats. Review is needed of the effectiveness of employing different combinations of active and passive defenses and the logistics requirements necessary to ensure the EEF has these capabilities in a timely manner. It is on the basis of such analyses that the selection of a cost-effective defense capability for the EEF can be made.

DB-119-A North Korean Nuclear Threat and Use (U). G. S. Jones, B. G. Chow, K. Oh. 1996. SECRET

(U) The United States is now confronted by a North Korea likely already armed with nuclear weapons, but can North Korea use such weapons effectively? How North Korea might use its nuclear weapons depends on its mission objectives, the size of its arsenal, the effectiveness of its delivery methods, and its ability to exploit, for political and military gain, the threat of nuclear attacks. This report discusses the estimation of the North Korean arsenal size, and the likely availability of alternative delivery methods, the probable scenarios of North Korean nuclear threat and use, and the assessment of the effects of North Korean nuclear attacks on various targets. The authors conclude that North Korea currently—with its small number of nuclear weapons—cannot use these weapons in such a way that its direct military effects would be decisive. The weapons, however, could be used to cause important political and indirect military effects. Moreover, in ten years, North Korea may well have a much larger arsenal that will permit much greater direct military effects to be achieved.

DB-120-A Assessment of Non-Lethal Unmanned Aerial Vehicles for Integration with Combat Aviation Missions. M. Callero. 1995.

This documented briefing presents an assessment of operational concepts for, and effects of, integrating unmanned aerial vehicles (UAVs) with combat aviation missions. The study indicates that combat aviation missions could be significantly enhanced if a UAV were integrated as a full member of the mission team. Improvements appear likely in mission effectiveness and in the efficiency with which aviation systems can conduct missions. Increased survivability should result from exploiting UAV-provided air defense information and reducing battlefield exposure due to greater mission efficiency. Mission efficiency also improves overall force utilization, thereby increasing aviation resource availability for combat operations. The integration concept, wherein the aviation team exercises positive control over the UAV throughout the mission, is preferred for all combat aviation missions and would be required for attack and air assault. The author recommends that specific analysis be directed at UAV sensor performance, survivability, near-earth operation, and airborne interface system requirements. In addition, a quantitative analysis of how integrating UAVs would change the operational effectiveness of combat aviation forces is essential to formulating a position on UAV development.

DB-126-1-A Velocity Management: An Approach for Improving the Responsiveness and Efficiency of Army Logistics Processes. J. Dumond, R. Eden, J. Folkeson. 1994.

Velocity management is a concept for dramatically improving the responsiveness and efficiency of the Army logistics system. It aims to substitute velocity and accuracy for mass in the logistics system. Reducing the cycle time of logistics processes promises the possibility of greater system responsiveness to the user's needs while permitting reductions in the size of safety stocks or days-of-supply that currently choke the system without adding much to achieved sustainment. Commercial firms that have adopted this general approach have achieved substantial improvements both in cost and, more importantly, in effectiveness in meeting their customers' demands. The approach requires the analysis and re-engineering of processes—e.g., supply, repair, and transportation process—to eliminate non-value-adding activities and to continuously improve the productivity of value-adding activities. The documented briefing proposes how the Army, working with the Arroyo Center, might proceed in moving the velocity management concept from the development phase to a pilot implementation.

DB-133-A Conducting Warfighting Experiments at the National Training Center. J. Grossman. 1995.

This documented briefing discusses how warfighting experiments at the National Training Center (NTC) can provide important qualitative insights into proposed changes in doctrine, training, organization, leadership, materials, and soldiers (DTOLMS). However, limitations in the NTC database, along with the statistical problems associated with a single "experimental" rotation, will limit the usefulness of the quantitative data generated in the warfighting experiment. The briefing also discusses how the NTC training environment further limits the usefulness of this data. To maximize the usefulness of these experiments, the author presents a methodology for selecting the right topics for experiments at NTC and shows how the analytic community plays a key role in the selection process. In addition, the author shows how the analytic community can utilize the data from the experiments to further analyze the concepts behind the experiments. Lastly, the briefing discusses how the high-stress training environment at NTC represents a significant source of data that can be used to determine what new equipment is needed, how new equipment can perform in combat, and how to make current simulations more realistic, particularly in the area of command and control.

DB-135-A Assessing the Future Role and Conduct of the Army Space Exploitation Demonstration Program (ASEDP). J. R. Hiland, G. Huth, S. Pond. 1996.

The Army Space Exploitation Demonstration Program (ASEDP) has been conducted for the past seven years as an important part of the Army's overall efforts to effectively utilize and integrate space assets and capabilities into its operations and other activities. This annotated briefing presents the results of an effort to review the current process used to select candidate space demonstrations, as well as the emerging interfaces with other new internal Army program initiatives that will shape the future context for this program. Improvements to the current selection process are suggested, and alternative future program directions are assessed. The

document also presents some viewpoints, gleaned from a series of interviews with 16 key Army people, on the ASEDP and Army space efforts in general.

DB-138-A Dual-Use Technology Program for a Passenger-Cargo Rotorcraft. D. Dreyfuss, C. L. Shipbaugh, J. Hagen, R. H. Buenneke. 1995.

Declining budgets are reducing the number of new military acquisition starts. The Army needs to consider new ways of doing business that will permit it to get the most from the acquisition dollars available. One possibility is to exploit dual-use technology programs. The Arroyo Center investigated the feasibility of the notion that the commercial aircraft industry could develop a rotorcraft for the civilian market that would also have application to the military, primarily as a replacement for the CH-47 helicopter. The authors identified and analyzed three likely markets: commuter passenger service in conjunction with same-day cargo deliveries; servicing of offshore oil rigs; and emergency medical services (EMS). The commercial passenger-cargo market is not likely to be viable because the rotorcraft's costs exceed by a wide margin those of the competing fixed-wing aircraft, even if the cost analysis counts the potential savings accruing from the convenience of vertiport locations in or near downtown areas. The offshore oil rig market and the EMS market both prefer a vehicle size of about 7-15 passengers, smaller than the Army's most pressing replacement needs. Further, neither of these markets looks feasible from the standpoint of rate of return on invested capital, if the total investment costs had to be recovered (no subsidies). The authors cannot recommend dual-use as a clear remedy for the Army's need for a near-term medium-heavy rotorcraft, but do suggest the examination of several cost-reducing technologies.

DB-144-A Improving Training at School and Work: Lessons from RAND Research on Army Individual Training. J. D. Winkler. 1995.

Individual training, which prepares soldiers to perform a military occupation and which occurs in classrooms, on job sites, and through self-development, is a large and costly part of Army operations, making it a tempting target for budget reductions. The Army has proposed several measures to reduce costs, under two general approaches: (1) shift training from schoolhouses to job sites and (2) make more use of mediated training technologies. With respect to the first approach, research shows that: (1) Army techniques for determining curricula for school and work-based training are sound; and (2) as training is shifted from work to school, costs and savings depend on the capacity for absorbing additional training in the field. With respect to the second approach, research shows that: (1) there is considerable room to increase the use of technology in schools; (2) most savings are obtained by adapting existing resources; and (3) technology should be used to replace, not enhance, hands-on training. These general lessons also seem relevant for civilian education and training, especially in technical fields.

DB-146-A German and Polish Views of the Partnership for Peace. T. S. Szayna, R. D. Asmus. 1995.

The Partnership for Peace (PfP) program can be seen as a lens for examining the larger security policy debates in Poland and Germany. This documented briefing traces the recent evolution of the security debate in each country, and notes how each has adapted PfP to suit its security policy needs. The research reveals that both Poland and Germany view PfP as the first step on a path to NATO membership for at least some of the partner countries, most of all Poland. Germany and Poland are making maximum use of the program to solidify their military cooperation, and both are hopeful that the United States takes a similar view toward PfP implementation. The main difference between the two countries relates to Russia: the Poles fear that Germany may bend its PfP policy of extensive cooperation with Poland to reach agreement on security issues with Russia. The briefing concludes with a discussion of the implications of the Polish and German interpretations of PfP for the United States and for the U.S. Army.

DB-150-A New Tools for Balancing Theater Combat and Support. D. Kassing, K. J. Girardini, B. Leverich, R. Stanton, R. Eden. 1996.

This report presents an overview of tools being developed to assist the Army in analyzing the effects of limitations on the size and speed of its deployments. The ROSE (RAND Operational Support Evaluator) model, a key product of this study, allows simultaneous input of combat and support plans; assesses the feasibility of combat and support plans; and is potentially useful with Army combat models at several Army commands. The authors have identified three general classes of interfaces; the most complex are those integrating ROSE with combat simulation that employs planning algorithms. The authors have also identified several problems that modelers will face in amplifying the integration of logistics and combat models. For example, the representations of combat and logistics must be compatible in several dimensions that range from the treatment of reception and onward movement to the definition sustainment of policies. Alone, the ROSE model can be used to address important problems; when linked to combat simulation it can become even more useful. Balancing combat and support is just one of many potential applications.

DB-153-A Restructuring the Total Army School System. J. Winkler. 1996.

This report documents a briefing on the Total Army School System that was given to the Vice Chief of Staff, U.S. Army, the Reserve Component Coordination Council, and FORSCOM's Command Readiness Program. It provides a baseline description of the RC system's operation, including quantitative data on (a) training requirements and school production, (b) quality of training, and (c) resources and costs. It also includes specific recommendations for solving problems within the

RC school system and actions outside the training system that are essential to improve RC readiness and training efficiency.

DB-160-A Army Force Structure in Two-MRC Campaign Studies (U). D. Kassing, R. Howe, D. Stevens. 1996. SECRET

(U) The Arroyo Center reviewed eight studies of the requirements for handling two near-simultaneous major regional contingencies (MRCs) and assessed their significance for Army force structure. The studies were found to have used different numbers of Army divisions—ranging from 9 to 12—although this implied a difference of only five maneuver brigades, namely 27 to 32. Five of the studies assessed only the risks and capabilities of the then-approved Army force. All used different criteria for "winning." All were based on optimistic assumptions about the performance of U.S. forces, especially air power and deployment systems. All assumed, but did not test, combat service and combat service support unit requirements. None performed significant sensitivity tests of varying force postures, and only a few varied key scenario or planning assumptions. Taken together, the studies did not provide a solid justification for any particular Army force. The authors recommend that the Army begin to prepare "the analytical battlefield" by examining substantially different campaigns within the context of approved planning scenarios, initiate work on new scenarios, and develop an agreed-upon definition of victory.

DB-168-A/OSD Rapid Force Projection: Exploring New Technology Concepts for Light Airborne Forces. R. Steeb, J. Matsumura, T. Covington, T. Herbert, S. Eisenhard. 1996.

RAND's Rapid Force Projection Technologies (RFPT) project supports OSD's and the U.S. Army's Rapid Force Projection Initiative (RFPI) and the RFPI/Enhanced Fiber Optic Guided Missile Advanced Concept Technology Demonstration (RFPI/EFOG-M ACTD). This report presents results and findings generated in the first two years of the RFPT project. The U.S. Army in future conflicts will need to deploy quickly by both air and sea to areas of potential or actual conflict. This study concentrates on the airliftable portion of these forces in the early-entry role. Light, airborne forces traditionally have had great difficulty in operating against heavy forces in terrain suitable for tank maneuvers. The study examines technology options identified in RFPI that allow light forces to fight and survive against heavy armored forces. The researchers determined the specific contributions of several advanced technology options in a future light force, using an integrated set of high-resolution simulations to perform detailed evaluations over several stressing scenarios.

DB-169-A/OSD Rapid Force Projection Technologies: A Quick-Look Analysis of Advanced Light Indirect Fire Systems. R. Steeb, J. Matsumura, T. Covington, T. Herbert, S. Eisenhard, L. Melody. 1996.

In the current environment, it is less and less likely that U.S. military forces will be called upon to defend a known terrain with a large prepositioned force. The U.S. Army in future operations will need to deploy quickly by both air and sea to areas of potential or actual conflict. The Rapid Force Project Technologies (RFPT) project at RAND concentrates on the airliftable portion of these forces in the early-entry role. (See RAND document DB-168-A/OSD for more information on the RFPT project.) In this quick-look study, the Arroyo Center assessed the effectiveness of different advanced indirect fire weapon alternatives to the light, airborne forces. The researchers used an integrated set of high-resolution simulations to determine the specific contributions of advanced-technology options within a future light force. The study reports the results of the analysis.

DB-172-A Assumption-Based Planning and Force XXI. J. A. Dewar, J. A. Isaacson, M. Leed. 1997.

Force XXI is the Army's ongoing process to define the Army of the next century. The current codification of Force XXI is in TRADOC PAM 525-5 dated 10 December 1993. RAND was asked to apply its Assumption-Based Planning (ABP) methodology to that version to assess its robustness into the future. Because Force XXI is an incomplete plan at this point, ABP was modified to include a "rationalization" step that attempts to connect the Force XXI assumptions about the future with the actions it recommends. Unconnected assumptions indicate actions yet to be specified. The remaining assumptions were judged (in conjunction with Army planners) for vulnerability in the coming decades. A variety of important vulnerabilities are highlighted in this documented briefing, the most significant of which relates to operations other than war (OOTW). The Army has much work ahead to develop a robust plan for future OOTW operations.

DB-173-A Establishing a Baseline and Reporting Performance for the Order and Ship Processes. K. Girardini, W. Lewis, R. Eden, E. Gardner. 1996.

This document annotates a slightly modified version of an executive briefing that was presented to the Logistics Triad in August 1995. The briefing's purpose is to (1) establish the order and ship time (OST) performance of the Army's order and ship processes during the baseline period (July 1994 to June 1995) preceding the introduction of Velocity Management improvements and (2) recommend mechanisms for monitoring and reporting improved OST performance. The briefing begins by defining the order and ship processes by which active TRADOC and FORSCOM units in CONUS order and receive materiel from the Army's wholesale supply system. The Army's Logistics Intelligence File (LIF) provides OST data on six segments of these processes.

The briefing proposes supplementing the Army's traditional metric of mean OST time with three additional metrics—median, 75 percent, and 95 percent—to permit additional insight into the variability of the performance, a chronic problem. A presentation of selected results of the LIF data analysis shows baseline OST performance to have been very slow and extremely variable. Appendices provide more detailed analyses. The briefing recommends that LOGSA provide (1) senior leaders with monthly performance reports by post and priority group and (2) Site Improvement Teams with weekly reports as well as access to the pertinent LIF data.

DB-175-A Military Modernization in East Asia: Capabilities and Implications (U). J. Isaacson, B. Nichiporuk, B. Chow, W. Tunick. 1997. SECRET LIMITED: US GOV'T AGENCIES & CONTRACTORS

(U) With the increasing proliferation of ever-more modern weaponry around the globe, any country with sufficient funds can buy just about any military technology it wants. What a country cannot buy so easily, however, is military *capability:* the requisite doctrine, tactics, training, logistics, organizational skills, and manpower to put the technology to effective use. The Arroyo Center is developing a framework for understanding the relationship between acquiring advanced technology and integrating it into foreign militaries. This report presents a methodology for tracking conventional military modernization that incorporates both technological and integrative considerations and applies it to ten East Asian countries. This research complements current U.S. Army efforts aimed at developing new intelligence methodologies for the post–Cold War era. The capability-based approach demonstrated in the report generates indicators for tracking evolving military capacity and establishing data-collection requirements. As applied to East Asia, the methodology reveals two important findings: (1) Owing to abundant integrative deficiencies, most East Asian nations are not now able to realize the full battlefield potential of their weapons inventories, nor are they likely to in the next ten years. (2) Despite these shortcomings, intraregional gaps may emerge as some nations but not others improve their integrative capacity. Such disparities could be exploited in a destabilizing manner.

DB-185-A Stability in South Asia. A. J. Tellis. 1997.

The most likely setting for the world's first nuclear war, observers generally agree, is South Asia, where India and Pakistan harbor small, undeclared nuclear arsenals and deep, often-declared mutual animosity. Chartered to determine whether and how the tense stability that now marks India-Pakistan relations might break down, this project identifies several paths to conventional and perhaps nuclear war. Neither country's view of nuclear weapons and warfare seems likely to produce the deterrent stability that marked the mature superpower relationship of the Cold War; rather, each sees some value in brandishing nuclear weapons in ways that could contribute to instability in a crisis. Nor are crises difficult to envision. In the near-to-mid term, the unconventional conflict that now simmers around Kashmir will continue, and could unexpectedly escalate to major conventional war. In the longer run, growing relative economic and military power could tempt India to launch a premeditated attack on Pakistan, should the latter not reach an accommodation with India before then. The study found that India and Pakistan both assume that outside powers, mainly the United States, will intervene to stop any major war on the subcontinent within two weeks after it begins. Should one of them launch a war on the basis of that assumption only to discover that it is incorrect, misperceptions of U.S. policy will have contributed to instability and raised the possibility of nuclear use as the war proceeds.

DB-186-A Reserve Component Linguists in Civil Affairs and Psychological Operations. R. E. Sortor. 1996.

The reserve component (RC) constitutes over 95 percent of the Army's wartime capability in civil affairs (CA) and 75 percent in psychological operations (PSYOP). In 1995, less than 10 percent of the RC language requirements in CA and PSYOP units could have been met with personnel possessing even elementary proficiency. This report documents the results of a special assistance effort to look into this shortfall for the Commanding General, U.S. Army Special Operations Command (USASOC). The results indicated that the shortage did not result from retention problems nor from a lack of proficiency among the trained linguists. The results did indicate that too few receive initial language training, and that trained linguists are not used efficiently. Substantial changes in language requirements were a major factor in the discrepancy between requirements and capability. Of the items warranting attention, the most important were the need for a clearly articulated policy for determining language requirements in CA and PSYOP units, the careful and disciplined coding of the requirements in the appropriate documents, and then the focusing of adequate resources to train and sustain the required linguists at the needed proficiency levels.

DB-198-A Analytic Support to the Defense Science Board: Tactics and Technology for 21st Century Military Superiority. J. Matsumura, R. Steeb, T. Herbert, M. Lees, S. Eisenhard, A. Stich. 1997.

This documented briefing summarizes a fast-response research effort that directly supported the Defense Science Board Summer Study Task Force on Tactics and Technology for 21st Century Military Superiority. This research examined the effectiveness of small dispersed force concepts, defined by the Defense Science Board, as they might be employed on a future battlefield. The RAND Arroyo Center was one of several organizations to provide analytic support to this study. The Arroyo Center's primary contribution focused on the higher end of the threat spectrum—small dispersed forces against attacking armor—representative of an early-entry phase of a larger conflict. We employed a fairly extensive

simulation environment to provide analytic-based assessments. Our work in this area continues to evolve as the research provides new insights and raises new questions.

DB-207-A Improving the Analytic Contribution of Advanced Warfighting Experiments. T. W. Lucas, S. C. Bankes, P. Vye. 1998.

Advanced Warfighting Experiments (AWEs) are central to the Army's efforts to support the development of Force XXI. Using combinations of live, virtual, and constructive simulations, AWEs are expected to inform the design, structure, and use of the future forces. This briefing discusses several ideas and methods that can help in getting more analytic benefit from the AWE process. Specifically, the "credible uses" methodology—developed at RAND—is applied in an example taken from the context of the Focused Dispatch AWE. This methodology provides an explicit link between decisions the analysis is intended to support and specific constructive, virtual, and/or live experiments. This methodology places strong requirements on the design of the experiments that comprise an AWE. The authors illustrate how this requirement can be met by adapting ideas drawn from the statistical literature on designing experiments and combining them with a modeling technique being developed at RAND called Exploratory Modeling. This approach will require changes to the process of conducting AWEs.

DB-214-A Information-Related Operations in Smaller-Scale Contingencies. S. T. Hosmer. 1998. FOR OFFICIAL USE ONLY. DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT ONLY. OTHER REQUESTS MUST BE REFERRED TO SPONSOR.

This documented briefing summarizes the findings of a study of U.S. intelligence, OPSEC/deception/C2-neutralization, public affairs, and psychological operations, particularly as they pertain to U.S. ground force operations in smaller-scale contingencies. These information-related operations are of critical importance to U.S. interventions in that they can save lives, reduce the magnitude and length of enemy resistance, promote public support for the involvements, and help ensure that the interventions are successful. The study analyzes the conduct and effectiveness of information-related operations in past U.S. interventions; examines the potential impact of the information revolution on future U.S. lesser-conflict operations; and offers recommendations for U.S. military commanders and civilian decisionmakers. These recommendations concern both the organizing, training, and equipping of U.S. forces and the planning and conduct of intervention operations.

DB-233-A Facilitating Effective Reform in Army Acquisition. J. N. Dertouzos, C. Schmidt, B. Benjamin, D. Finegold. 1998.

This documented briefing examines both the acceptance/progress of current acquisition reform efforts and the factors affecting the support for these efforts within the Army's acquisition work force. Acquisition reform, in this context, is limited to three initiatives: (1) the discontinued use of military specifications and standards, (2) the use of integrated product teams (IPTs), and (3) greater use of government-industry "partnerships" in the procurement process. The data used in this study were gathered through detailed interviews with and surveys of acquisition personnel in the military, government, and private sectors. Although milspec and standard reform have strong support within the work force, the data suggest that resistance to reform efforts is largely related to one's functional domain within the work force. In general, beliefs about how eliminating milspecs and standards affect product quality, life-cycle costs, and current program costs were the most important predictor of whether or not a worker "supported" the elimination. Support is also strong for greater use of IPTs within the acquisition process, although there is much room for improvement in implementing them. Finally, greater cooperation—in the form of "partnerships"—with industry is supported within the acquisition work force. However, the full use of partnerships has been hampered by significant organizational and process barriers. Chief among these are a lack of trust between government and industry, inflexible requirements, functional resistance, and inadequate past performance data. Overcoming these factors may rely greatly on the success of the other reform efforts (milspec and standard elimination and IPTs) as well as the refinement of existing contractor certification processes.

DB-242-A Predicting Military Innovation. J. A. Isaacson, C. Layne, J. Arquilla. 1999.

Although military technology is increasingly available and affordable, not all states have the capacity to improve military effectiveness by acquiring hardware. Integrative difficulties—in command structures, doctrine and tactics, training, and support—are common in the developing world, and many states will have to find some level of innovation to overcome such difficulties if they are to use military technologies effectively. This briefing documents a research effort aimed at understanding and predicting how militaries may improve—or fail to improve—their battlefield effectiveness. The briefing first analyzes military innovation conceptually and then formulates a framework for predicting the likelihood of innovative success. The research synthesizes a broad literature on innovation and provides a useful tool for assessing future military developments.

DB-245-A Fundamental Research Policy for the Digital Battlefield. L. Joe, P. Feldman. 1998.

The Department of Defense is looking to commercial information technologies to meet its needs for digitization equipment. The commercial marketplace has shown responsiveness and agility in meeting the growing civilian

demands for robust, reliable, and ubiquitous communications. Many of these technologies are of direct use or can be leveraged to develop systems for the military. This study examines the ability of the commercial marketplace to meet the future needs of the Army, and it identifies research areas for Army investment. The study focuses on identifying fundamental communications network characteristics (physical topology, operating environment, user needs) that uniquely define the Army's communications problem and are not being addressed by commercially driven research. The authors develop a framework that links the Army's future operational capabilities to system design tradeoffs. This framework is then used to examine how well commercial systems can meet Army needs. The authors find that commercial wireless systems will not meet the Army's future needs, and the Army needs to trade off requirements with future investments in research and Army-unique systems. Specific recommendations for Army investment in specific technologies are provided in a companion report: Phillip M. Feldman, *Emerging Commercial Mobile Wireless Technology and Standards: Suitable for The Army?* MR-960-A, 1998.

DB-248-A Engaging the Mexican Military: Challenges for the U.S. Military. K. F. McCarthy, K. M. O'Connell, D. F. Ronfeldt. 1998. DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES ONLY. OTHER REQUESTS MUST BE REFERRED TO DCSINT.

Mexico is currently in the throes of a structural transformation that threatens its traditional political and social order and the current government's ability to pursue its program of political and economic reform. Mexico's current president, Ernesto Zedillo, has expanded the traditional duties of the Mexican military in the hopes that this will buy time for his reforms to work. This situation poses problems for the U.S. Army's efforts to engage the Mexican military. This documented briefing explores the roots of the current situation and the challenges it poses for the U.S. military. It offers a range of scenarios for future consideration together with possible responses for the U.S. military. This analysis suggests that the U.S. military's options to influence their Mexican counterparts are limited, thus the U.S. military should proceed with caution in any such attempts.

DB-265-A The Use of Microworld Simulations to Train Theater Level CSS Staffs: Training Development Considerations. E. Ettedgui, D. Oaks, J. Bondanella. 1999.

The changing nature of the Army's operational environment and its growing dependence on force deployment place a high priority on the early deployment of combat service support (CSS) units, which are essential supporters of U.S. forces in a theater. The training methodology and training support tools for the higher-level command and control (C2) headquarters staffs of these CSS units have been updated slowly, if at all, to meet the demands of the changing environment. The authors discuss a microworld simulation modeling approach that can facilitate changes in structure and content for training CSS staffs operating as staffs, not individuals. The briefing illustrates how microworld models can be used to train CSS processes. The discussion includes an overview of how these models operate and what the prototypes are intended to illustrate in a training curriculum. The authors conclude with some general lessons learned from developing and testing these prototype models with an actual training audience, and they suggest how training developers may proceed to redesign mission training plans for higher-level theater CSS C2 staffs.

DB-270-JS/A ". . . we band of brothers": The Call for Joint Urban Operations. R. W. Glenn. 1999.

Recent historical events and changing world demographics caused the U.S. military to recognize shortfalls in its urban operations doctrine. The J8 Urban Working Group therefore asked RAND to conduct a study to identify requirements in this area. This document summarizes that study, which was conducted in three phases. The first was a determination of the current status of joint urban operations doctrine. The second phase involved identification and description of the character such a doctrine should take. The third and final analytical step was a compilation of specific requirements that literature reviews and extensive field interviews dictated should be part of a U.S. joint military operations on urbanized terrain doctrine. The author determined that urban operations doctrine was needed and that it should be in the form of a separate joint publication. Subsequent to his work, the Joint Doctrine Working Party directed that work begin on the heretofore nonexistent Joint Publication 3-06 (JP 3-06), Doctrine for Joint Urban Operations.

CONFERENCE PROCEEDINGS

CF-138-A Future Leader Development of Army Noncommissioned Officers: Workshop Results. J. D. Winkler, H. J. Shukiar, J. Sollinger, J. A. Dewar, J. Peters, B. Benjamin, M. Lewis, H. Thie. 1998.

This document reports recent efforts by the RAND Arroyo Center and the U.S. Army Noncommissioned Officer Corps to examine ways of strengthening NCO professional development. It presents proceedings and results of two workshops held to assess the current NCO leader development system and develop a "vision" of where the NCO corps wishes to head. In addition, it identifies policy issues that emerged from these workshops. Workshop participants found that the leadership development system was fundamentally sound, with only selected areas requiring improvement: the self-development component of the Noncommissioned Officer Education System

(NCOES), the incentives for noncommissioned officer education, and the timing and rigor of the institutional instruction. The vision developed in the second workshop was intended both to address issues in the current system and to provide principles that will enable the Army to adapt to an uncertain future. The document also identifies some research implications of the workshops. Two areas needing additional analysis are the self-development component of the NCOES and the alignment between enlisted personnel management policy and professional development.

CF-143-A Denying the Widow-Maker: Summary of Proceedings of the RAND-DBBL Conference on Military Operations on Urbanized Terrain. R. Glenn, R. Steeb, J. Matsmura, S. Edwards, R. Everson, S. Gerwehr, J. Gordon, with F. Milton, T. Thomas, R. Sullivan, T. Cucolo, G. Schenkel. 1998.

This document summarizes a February 1998 conference on military operations on urbanized terrain (MOUT), co-hosted by the Arroyo Center and the U.S. Army Infantry School Dismounted Battlespace Battle Lab. The agenda included presentations on recent historical events (Grozny, Hue), ongoing operations in urban areas (Bosnia), and initiatives under way to improve future force readiness to conduct military operations in cities. Conference participants developed near- and longer-term approaches to attain such improvements. This summary compiles the views presented and the issues debated during the conference. Copies of the slides used by the speakers appear in the appendixes. The conference attendees agreed that continued reliance on World War II-type combat methods for operations in cities was counterproductive. While it was recognized that near-term improvements would be limited to enhancing current procedures via modified doctrine, training, and extant or proven concept technologies, such changes could at best result in marginal upgrades in force readiness. For the longer term, alternatives to large-scale commitments of U.S. manpower into urban areas and subsequent engagement of adversaries at close range was deemed desirable. Early research reflects that such a significant change in methodology may be feasible by the opening years of the next century's third decade.

ISSUE PAPERS

IP-105-A/AF Germany's Geopolitical Maturation: Strategy and Public Opinion After the Wall. R. D. Asmus. February 1993.

This issue paper presents the key findings of a recent public opinion survey conducted for RAND by Infraetest Burke Berlin in late 1992. The survey was the most recent in a series of RAND-sponsored opinion polls that seek to understand the future of German strategic thinking and implications for U.S. national security strategy. This year's survey results contain good news for American policymakers on an array of issues. A majority of Germans look forward to the Clinton Administration and view a more concerted U.S. effort to confront its domestic problems as a prerequisite for a strengthened U.S.-European relationship. German public support for NATO, for an American military presence in Germany, and for a broader "out of area" role for the alliance is on the rise. Germans also support European integration and see a strengthened European Community as a basis for a new "partnership among equals" across the Atlantic. Finally, the German public overwhelmingly supports the government's efforts to combat right-wing extremism. (For a more complete version of the survey results, see MR-444-FNF/OSD/A/AF)

IP-106-A New Army Noncombat Initiatives. E. H. Ondaatje. April 1993.

This issue paper outlines the U.S. Army's current role in three noncombat initiatives-education and community service; nation assistance, particularly in the former Soviet Union and Eastern Europe; and disaster management-suggests potential new activities in these initiatives, and examines some possible concerns. Following the evaluation of the three initiatives, the document concludes that if noncombat activity expands as a proportion of total Army activity, the Reserve Component share of that total might increase disproportionately. The document also observes that in terms of much of its ongoing noncombat activity, the Army does not receive credit in the public mind, does not adequately reward its participants, and does not incorporate these activities into its image (or vision) of itself and that Army leadership could easily reap public benefits by highlighting its noncombat contributions. The document ultimately points out that although the Army has the requisite capabilities for performing noncombat activities, in the final analysis the activities must be evaluated within the context of a U.S. Army vision.

IP-128-A Materiel Distribution: Improving Support to Army Operations in Peace and War. John M. Halliday, Nancy Y. Moore. March 1994.

This issue paper identifies problems in the DoD distribution system, describes industry's practices, and suggests what DoD should do to improve its operation. The underlying causes of the distribution problems are many and complicated, but they group into four general categories: structural issues, user reactions, unresponsiveness to change, and low standards. On the other hand, commerical organizations have had tremendous success improving their distribution processes through a combination of organizational and technological change. Industry differs from DoD in that it operates to make a profit, but it also differs because its distribution system focuses on a single goal—a satisfied customer. The authors conclude by stating that the DoD should: (1) study industry distribution models carefully and selectively use or adapt them; (2) reengineer the system to

determine which steps can be elimated, automated, or combined, which technologies are needed, and which of those offer the largest gain; (3) establish high standards of performance for each distribution element and measure the performance of each element against the standard.

IP-137-A Russian Military R&D: Are the Regions Taking Charge? S. Leiter, C. M. Levy. November 1993.

This issue paper examines the future of Russian weapons acquisition and military R&D, hypothesizing that the most fruitful way to examine what is still a primordial soup is to take a regional approach. Based on preliminary observations and research, the authors argue that in terms of the Russian R&D establishment that will develop, the regions are clearly no longer passive players in the federal-local game, but will now be active in shaping national policy. Over the next few years, the interdependence of regional and state levels are expected to develop along new lines, divorced from the old Communist, center-dominated system. Science and technology, both military and civilian, will play a central role in this evolution. Given the unevenness and diversity of the diminished but still vast Russian science establishment, individual case studies, tracing the evolution of the major regional R&D centers, will offer the best insights into Russia's resurgent military potential.

IP-142-A From Anarchy to Order in Russian Military R&D? Adam Stulberg. March 1994.

This issue paper examines the state of administrative control over Russian military R&D in the wake of the collapse of the Soviet Union. In contrast to the devolution of power experienced in other political, social, and economic spheres, there are strong indications of critical limits to regionalization and of emerging trends toward the recentralization of federal authority over Russian military R&D. In both the short- and long-terms, the federal government has the greatest stake in continued support of military R&D. More significantly, it enjoys economies of scale in providing key financial and material resources, and in coordinating extraregional ties with potential markets and the broader scientific community that are vital to the sponsorship of the military R&D establishment. Nevertheless, because of resource stringency of its own and incoherence in terms of policy design and implementation, the Russian federal government's ability to parlay this recentralization into an effective and aggressive military R&D effort remains suspect.

IP-165-A Reengineering DoD Recruiting. J. R. Thomas. 1997.

This issue paper considers lessons from commercial organizations that could improve the efficiency of the military recruiting process. The paper focuses on the process by which the Army and other services identify and contact young people who may be willing to enlist. To carry out such functions in civilian organizations, the telemarketing industry has combined technology with professionally prepared sales presentations to develop leads efficiently. Taking a similar direction, this paper proposes an alternative process and structure for recruiting, including more extensive use of telemarketing and a joint lead development process.

IP-167-A Bettering the Balance: Large Wars and Small Contingencies. S. T. Hosmer, M. Leed, D. Persselin, J. M. Sollinger, R. E. Sortor, J. M. Taw. 1997.

How can the Army remain prepared to fight major theater wars, its primary but least likely mission, while participating in smaller-scale contingencies? These operations have been occurring with increasing frequency, and they can erode the Army's capability to perform its primary mission. Combining the results of three recent Arroyo Center studies, this issue paper explores the concern that too great an involvement in these smaller-scale contingencies can undercut the Army's ability to do its primary job, particularly in light of force structure reductions that have left the Army thin in certain types of skills and units. Smaller-scale contingencies make units unavailable for other types of operations, and their preparation and recovery activities extend the time they are unavailable beyond their actual presence in theater. Also, deploying units may be filled to deploying strength or given additional capabilities by borrowing people and equipment from units that do not deploy. This practice spreads the unavailability effect, since the units that stay behind are then less capable of training or responding to other missions. The capabilities of deploying units are affected because even though they perform many of the tasks that they would in major theater wars (e.g., patrolling), the conditions and standards differ greatly. Thus, the unit has to undergo a period of retraining when it returns. Unit equipment is also affected. The Army has a number of options—some relatively simple—that it can pursue to enhance or expand on its capability for these operations. It can use contractors, rely on the reserves to restore warfighting capability, redesign existing organizations to give them a wider range of capabilities, improve routine training and provide more predeployment training, reduce equipment problems by altering logistics processes and priorities, and improve its effectiveness at information-related operations with an eye to shortening smaller-scale contingencies.

RESEARCH NOTES

RB-3006 Speeding the Flow: How the Army Cut Order-and-Ship Time. 1998.

In 1995, with the analytic support of the RAND Arroyo Center, the Army implemented the Velocity Management (VM) initiative, which adapts to the military many of the technological and managerial innovations that have proved successful in the commercial sector. Under the VM initiative, the Army has made impressive headway in improving the effectiveness and efficiency of the order-

and-ship process. For orders of repair parts (Class IX supply) that were placed by active units in the continental United States (CONUS) and filled by the wholesale supply system, order-and-ship times (OST) have fallen about 50 percent (this excludes items that are backordered). At leading installations, the reduction in median OST has been over 70 percent. A key element in achieving these reductions was the Army's partnering with the Defense Logistics Agency and commercial truckers to increase the use of scheduled trucks. By the end of 1997, between 40 and 50 percent of all shipments from DLA depots to major Army installations in CONUS were sent on scheduled trucks, and the mean OST for these shipments was four to five days faster than the mean OST for other shipments combined. The VM initiative is not limited only to the order-and-ship process nor only to reducing cycle times. The Army is applying the VM improvement approach to the repair process and the stockage-determination process as well as to the financial management process. The goal is to identify and eliminate sources not only of delays but also of errors and waste, creating a logistics system that is faster, better, and cheaper.

WHITE PAPERS

WP-119 Reactive Armor Tiles for Army and Marine Corps Armored Vehicles: An Independent Report to the Department of Defense and the United States Congress. J. D. Pinder. 1999.

This independent report on the results of a congressionally mandated study of reactive armor (RA) tiles for U.S. Army and Marine Corps armored vehicles was submitted to Congress in April 1999. It relies on an extensive supporting analysis conducted by the U.S. Army Materiel and Systems Analysis Activity in cooperation with the U.S. Army Research Laboratory. The study focused on two Army vehicles, the Bradley Fighting Vehicle (BFV) and the M113 family of vehicles. Three types of RA tiles were evaluated: the current "production" BFV tile, a new "1-2 year" developmental M113 tile, and a more advanced "2-3 year" design. All of these designs significantly improved vehicle survivability, but the 2-3 year tiles provided the most robust protection for both vehicles against likely 2005 threats. In the case of the M113, however, the somewhat lighter and less costly 1-2 year tiles might be preferred in situations where advanced threats are not so prevalent. The report makes several policy recommendations: (1) The Army should develop a new universal enhanced RA tile based on the 2-3 year design for both the BFV and the M113, at an estimated cost of $11 million. This effort should include the development of an optimum coverage pattern for the weight-constrained M113A3 tile sets. (2) Enough additional production tile sets should be procured to equip a substantial portion of the BFVs in the Army's Contingency Response Forces, and a sufficient number of the new enhanced tile sets should be procured to outfit an additional brigade of BFVs. At least this many M113A3 enhanced tile sets should also be procured, plus enough additional sets to meet identified needs. (3) Further research should be done on the need for RA tiles on M113s in their typical roles and missions, and on the appropriateness of RA for urban operations. Also, the Marine Corps and the Army should consider whether the new universal RA tile would be appropriate for other vehicles in the future, especially those being considered for the Army After Next.

WP-120 Maintaining the Army's "Smart Buyer" Capability in a Period of Downsizing. K. Horn, C. Wong, E. Axelband, P. Steinberg, I. Chang. 1999.

This paper draws on current and ongoing research to identify what is needed to counteract the effect of personnel downsizing through changes/efficiencies in the "smart buyer" (SB) process and workforce. Three ingredients are needed to provide a good SB capability: (1) a collaborative research environment that forces SBs to be aware of what is going on outside their own organization; (2) communications with users, specifically with both concept and materiel developers; and (3) a cadre of talented and trained technical staff. Providing the first ingredient will entail implementing new ways of doing business using acquisition-reform initiatives that permit leveraging of the other services and government agencies and partnering with industry. Providing the second might entail developing organizational realignments that allow close two-way SB communications. To provide the third, the Army should exploit the full range of recruiting tools to attract the most promising candidates, implement career development opportunities to ensure that employees can perform the SB function, and create influences to encourage talented and promising SBs to stay.

REPORTS

R-2518-A Performance of Tactical Millimeter-Wave Radio Links: Vol. I: Executive Summary (U). J. R. Clark, W. Sollfrey, S. Katz. 1980. CONFIDENTIAL LIMITED: US GOV'T OR REFER TO CLIENT

(U) This report summarizes an investigation of propagation effects on terrestrial millimeter-wave radio links. The objective of the study was to investigate the environmental performance of short-range millimeter-wave transceivers with voice, video, and data communication capabilities. The emphasis was on the two frequency bands 35–40 GHz and 50-70 GHz, and on the

propagation phenomena important in these bands. Two key conclusions are (1) rain attenuation in the 37-70 GHz region is significantly less serious than is commonly believed and (2) the advantages of operating in the 60 GHz oxygen absorption band far outweigh the disadvantages. The key benefit that oxygen absorption offers is overshoot control (control of transmitted radiation that is subject to interception by an unintended listener).

R-2805-A Spatial Learning and Reasoning Skill. S. E. Goldin, P. W. Thorndyke. 1981.

A series of studies undertaken to identify skills required for successful spatial performance. A study of requirements for distance estimation, self-orientation, and object location tasks supported the assumption that the type of spatial knowledge acquired depends on the learner's information source. A second study showed that filmed traversal of an unfamiliar route provides as much knowledge about landmarks, landmark sequence, and distances as a live tour, but not sufficient information about angles of turns to allow accurate self-orientation. Studies of cognitive mapping skill showed that good mappers excel at acquiring knowledge from navigation or maps, at manipulating information in memory, and in visual memory, visualization, and spatial orientation ability. Good and poor mappers do not differ in map reading, map interpretation, or navigation skill. Examination of two different strategies for learning a new environment from navigation indicated potential benefits from training strategies compatible with the learner's abilities.

R-3115-A Forecasting the Wages of Young Men: The Effects of Cohort Size. H. W. Tan, M. P. Ward. 1985.

In this study, the authors develop forecasts of the civilian wage structure over the next two decades for a variety of different scenarios. They focus on how the wage structure will change as the demographic trend reverses itself, i.e., as the smaller post-baby-boom birth cohorts enter the labor market in the 1980s and 1990s. Section II of the report describes the survey data used to create a working file for the analysis. Based on this file, the authors paint a broad overview of how cohort size and relative wages have changed over the 1967–1980 period. Section III discusses the wage model used and highlights the main empirical results. The assumptions and approach used to forecast wages are detailed in Sec. IV. Section V extends the wage model to investigate two alternative explanations for the observed decline in youth wages. The last section concludes with a summary of the main findings and their implications for military compensation policy.

R-3382-AF/A Joint Air Defense: An Assessment of the Planned Patriot/F-16 Mix in Central Europe (U). P. M. Dadant. 1987. SECRET NOFORN WNINTEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This study assisted an Army/Air Force Joint Working Group charged with performing a net sensitivity analysis of the preferred mix of area-defense surface-to-air missiles and air defense aircraft. It used RAND-developed models to investigate the sensitivity of the 1993 U.S. Patriot/F-16 mix in Central Europe to changes in estimates of the air defense effectiveness of these two systems and of some other parameters (e.g., aircraft sortie rates and effectiveness in other missions). Given the uncertainties inherent in these estimates, the programmed mix of these weapons appeared to be a well-balanced compromise. The programmed mix was found to perform comparably to the preferred mix except in cases where the air defense effectiveness estimates of the two systems were highly optimistic or highly skewed. If these estimates are highly optimistic, the preferred mix should be heavier than the programmed mix in the more flexible weapon, the F-16. If the estimates are skewed, the preferred mix should be heavier in the more effective weapon. However, the war's progress would be more sensitive to other factors than to changes in the Patriot/F-16 mix.

R-3388-A Space Systems and Army Missions: A RAND Assessment (U). R. E. Darilek, E. M. Cesar, C. M. Crain, R. A. Eden, G. Gould, J. Hiland, K. P. Horn, M. F. Lawrence, K. E. Phillips, P. J. Romero, J. H. Rosen, K. Watman. 1986. SECRET LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report documents the results of the first phase (through December 1985) of a project whose chief task was to provide an independent assessment of the Army's future role in space. The report treats a wide variety of potential applications of space to Army missions and presents a methodology for managing their conceptual development, analysis, and assessment. The most promising applications are: (1) battlefield probe surveillance beyond the forward line of own troops; (2) monitoring transportation assets and cargo; (3) attacking fixed ground targets; and (4) counterfire and warning against tactical ballistic missile transporter-erector-launchers. The analysis suggests some initiatives that the Army can undertake now to build toward the realization of space systems in the near, mid, and far terms. Such initiatives include system definition, experimentation, demonstration, tradeoff analysis, and participation in joint efforts.

R-3436-AF/A Intrepid Falcon: An Experiment in Contingency Gaming (U). M. E. Morris, C. H. Builder, W. M. Jones, D. A. Shlapak, R. A. Levine. 1987. SECRET NOFORN LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) In 1985, RAND researchers developed a political/military seminar-type game called "Intrepid Falcon," which was subsequently played in a foreign country by senior military officials from the United States and the host country. This report records the history of the game, from the preliminary agreements under which it was commissioned, to the design, testing, and actual play in the host country. Appendixes contain documentation such as

scenarios, move papers, and background information used in the game.

R-3513-A The Army in the Strategic Planning Process: Who Shall Bell the Cat? C. H. Builder. 1987.

This report documents individual research undertaken by the author during a one-year assignment to the Army's Concepts Analysis Agency as their Distinguished Visiting Analyst. The research explored the definition and significance of strategy, comparative analysis of the three services on various aspects (particularly their approaches to strategy), and a close study of the Army's unique problems and opportunities regarding strategic planning. The author suggests that the Army is in a special position to participate in the strategic planning process—through the "daring deed" of determining price tags for our explicit national commitments to use military force. Those price tags include the military (as opposed to the political) objectives of our forces if they must fight, the adequacy and composition of our forces, and the risks the national leadership must accept in making or withdrawing those commitments. The risks of interservice strife of course pose a cost to the Army.

R-3553-A The French Army and Combined Operations in NATO's Central Region (U). M. A. Lorell. 1988. SECRET

(U) This report assesses the employment concepts, doctrine, force structure, and capabilities of the French Army within the overall context of current French security policy and strategic doctrine. It is part of a larger effort aimed at improving understanding and cooperation between NATO armies and the U.S. Army by identifying national differences that might impair combined operations in wartime and recommending ways of reducing these differences. Though superficially similar to other NATO armies, the French Army—and its use in NATO contingencies—differs considerably from other armies in the Alliance. French Army organization, equipment, and unit capabilities and configurations differ considerably from those of most other NATO armies in ways that may impede smooth integration of French forces into combined operations in the Central Region. French security policy and strategic doctrine place special conditions and constraints on the participation of French forces in NATO scenarios. Highly detailed agreements and plans govern NATO employment of French Army forces. Organizational and doctrinal changes currently under way may ultimately lead to new NATO roles for French forces.

R-3564-A Surveying Relevant Emerging Technologies for the Army of the Future: Lessons from Forecast II. R. E. Darilek, E. M. Cesar, J. A. Dewar, G. Gould, E. D. Harris, J. Hiland, K. P. Horn, M. M. Nelsen, K. E. Phillips, J. H. Rosen. 1988.

This study evaluated the U.S. Air Force's survey of emerging technologies of the future, Project Forecast II, for its relevance to the Army's potential requirements for the future, as indicated by the Army 21 Interim Operational Concept. The study concluded that there is a high correlation between the Army's needs and the technologies identified in Forecast II, although the Army could benefit from a poll of its contractors to uncover more Army-relevant technologies. In addition, by using systems as the bridge between projected technologies and specified military capability requirements, as the Air Force did in Forecast II, the Army could take advantage of a valuable means of establishing and gauging the relevance of emerging technologies to future requirements.

R-3579-A Support for the Army Intelligence, Electronic Warfare, and Target Acquisition Master Plan (U). E. M. Cesar, M. G. Kroger, A. J. Alexander, T. B. Garber, E. D. Harris, R. E. Huschke, M. M. Nelsen, P. J. Romero, J. H. Rosen. December 1988. SECRET LIMITED: US GOV'T OR REFER TO CLIENT

(U) This report documents analyses performed in support of an Army formulation of a new Intelligence Electronic Warfare Master Plan (AIMP). It analyzes technology areas pertinent to Army intelligence and electronic warfare (IEW) programs and suggests research and development initiatives for both near- and longer-term investments. A compendium of some of the key technologies and their relevant characteristics is provided with annotations concerning implications for IEW systems using the technologies. A methodology for the requirements-based derivation of technology needs and the identification of potential technical solutions are presented, along with a set of aggregation and filtering tools. The report discusses decisionmaking methods, such as focus groups and the analytical hierarchy process, that might be used in future budget decision processes to aid in reaching consensus and to capture expert judgments and decision rationales for IEW resource allocations.

R-3589-A Deep Operations at NATO's Central Army Group (U). J. P. Kahan, L. M. Jamison. 1988. SECRET

(U) This report describes and clarifies the decisions of the Commander of the NATO Central Army Group (CENTAG) regarding deep operations as part of his overall plan in a conventional (nonnuclear) war. The authors examine these decisions, particularly as they relate to the U.S. Army's AirLand Battle doctrine, NATO's subconcept of follow-on forces attack, and the current implementations of deep operations at CENTAG. They relate the doctrinal aspects of those decisions to the evolution of their implementation as observed in a number of 1986 and 1987 command post exercises. The observations focus on four points: (1) deep operations are increasingly joint air and ground operations; (2) deep operations decisions are made at the Army Group level, not at the corps level, as some doctrine would indicate; (3) both CENTAG and its subordinate corps have roles in the detection of significant enemy events and in planning the attack of deep targets; and (4) although AirLand Battle doctrine provides a general framework for understanding command decisionmaking, it cannot by itself specify a commander's information needs for prosecuting deep

operations. Finally, the authors comment on differences between formal doctrine and practice, and outline observations that guide their underlying study of commanders' information needs.

R-3615-A Army 21 as the U.S. Army's Future Warfighting Concept: A Critical Review of Approach and Assumptions. Y. Ben-Horin, B. C. Schwarz. 1988.

This report discusses an attempt to identify the major problems with the existing Army 21 Interim Operational Concept and suggests an alternative framework for the Army's study of future warfighting concepts. With the current Army doctrine—AirLand Battle—as the baseline, the plausible variations in implementation should be made over the next 10 to 15 years. The objective would be to project an estimate of Army needs and preferences. A long-term exploration effort would extend 30 to 40 years, where projections are necessarily highly speculative. Essentially deductive, this effort would consider a range of visions and would highlight generic developments. The purpose would be to stimulate conceptual thinking by contrasting different concepts, profiting from comparisons and choices between and among them.

R-3617-A LHX Helicopter and Tilt Rotor Flight Simulator Experiment. C. T. Veit, M. Callero, B. J. Rose, L. M. Jamison. 1989.

The LHX (Light Helicopter Experimental) flight simulator experiment was designed to identify differences between an LHX helicopter and tilt rotor in performance, target engagement, and evasion of an enemy air-defense threat. Ten experienced helicopter pilots flew 17 mission tasks in both aircraft simulators. The helicopter significantly outperformed the tilt rotor in the four tasks requiring primary bob-down and lateral-mask evasion tactics. The tilt rotor significantly outperformed the helicopter in eight tasks; pilots accelerated and decelerated faster with less severe pitch attitudes, and the tilt rotor's pitch-pointing capability reduced engagement and evasion times against elevated and depressed targets. Four Army pilots completed a questionnaire in which they judged the tilt rotor to be more operationally effective than the helicopter in eight of the ten combat situations presented. The authors recommend that the Army further investigate the tilt rotor's potential, regardless of its LHX decision.

R-3621-A Engineering Survivability Analysis of LHX Aircraft Alternatives (U). E. C. Gritton, H. H. Bailey, L. G. Mundie, C. M. Crain, H. Ory. 1989. SECRET LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report describes the engineering methods used to estimate the survivability performance of alternative helicopter and tilt rotor configurations, as well as an upgraded AH-64 Apache that might be developed for the Army LHX (Light Helicopter Experimental) mission. The report develops radar, infrared, visual signature levels, and detection algorithms and estimates performance for representative Soviet sensor and weapon systems operating against LHX aircraft configurations.

R-3625-A Design, Performance, and Cost of Alternative LHX Configurations. G. K. Smith, G. F. Acker, J. H. Bigelow, D. Dreyfuss, S. V. LaForge, R. Y. Pei, S. A. Resetar, R. L. Petruschell. 1988.

This report describes the methods used to compare alternative designs of helicopter and tilt rotor configurations, and alternative versions of an upgraded AH-64 Apache, that might be developed for the Army LHX (Light Helicopter Experimental) mission. It presents vehicle configuration, performance, and cost characteristics for several alternative LHX options.

R-3627-A Inside the Soviet Army in Afghanistan. A. Alexiev. 1988.

This report on the Soviet army in Afghanistan focuses on morale, discipline, motivation, and cohesion. It is based on interviews with former members of the Soviet armed forces in Afghanistan, interviews with Afghan resistance leaders and former officers, and a literature search. The report examines major factors that negatively affect morale and discipline: indoctrination, personnel relations, drugs and alcohol, quality of life, atrocities and looting, and theft and corruption. Such factors have led to infractions ranging from insubordination to fragging. The author finds their operational significance difficult to assess but believes that the relevance of possible systemic vulnerabilities to an East-West conflict should be explored. The report concludes that Soviet war conduct is not motivated by ethical considerations; thus, the Soviets can be expected to disregard conventions.

R-3634-A Gorbachev and the New Soviet Agenda in the Third World. F. Fukuyama. 1989.

This report, part of a study of the types of threats that Army planners might encounter in the Third World, evaluates the impact that Mikhail Gorbachev has had thus far on Soviet Third World policy, as well as prospects for future evolution. The study evaluates new Soviet thinking on foreign policy and measures the changes in rhetoric against actual Soviet behavior. It analyzes the new Soviet emphasis on the large states of the Third World. As an example of this new Soviet diplomacy, it presents a detailed case study of Soviet policy toward the Persian gulf in 1986–1987.

R-3643-A A New Approach for the Design and Evaluation of Land Defense Concepts. P. J. Romero. 1991.

The U.S. Army has made the development of new concepts for land warfare a priority since the early 1980s. Unfortunately, few techniques have been available to help design or evaluate concepts in a rigorous, objective way. This report contains the results of a two-year effort to develop an intellectual framework for thinking about, designing, and evaluating land defense concepts. It is

aimed at making the process by which the Army develops and evaluates concepts more rigorous and more efficient. The suggested improvements are of three types: (1) a typology—drawn from Army doctrine, NATO defense plans, and unofficial NATO defense concepts since the late 1940s—that allows different concepts to be described concretely and compared using a common vocabulary; (2) a review of the strengths and weaknesses of the Army's current approach for developing and evaluating concepts (the Concept-Based Requirements System, or CBRS) and a proposed analytic framework to ameliorate some of the shortcomings; and (3) a microcomputer-based, low-resolution Method of Screening Concepts of Warfare (MOSCOW), which can be used to refine and compare concept ideas in a systematic, quantitative way.

R-3673-A Evaluating the Combat Payoff of Alternative Logistics Structures for High-Technology Subsystems. M. B. Berman, D. W. McIver, M. L. Robbins, J. Schank. 1988.

This report identifies and evaluates alternative logistics structures that better support high-technology subsystems used by major U.S. Army weapon systems. It uses a new methodology to examine combat logistics structures. The report begins with a base case in which one set of M-1 tank test equipment is located in each Forward Support Battalion. It uses RAND's Dyna-METRIC model to assess the costs and benefits of alternative logistics structures relative to this base case. The alternative logistics structures were selected to examine the influence of different structural characteristics: (1) consolidating test equipment and personnel at higher echelons to increase responsiveness to variations in demand at lower echelons; (2) decentralizing test equipment and personnel to maneuver battalions to increase battalion unity of command; (3) varying the amounts of test equipment and personnel to examine the effect on repair queues; and (4) increasing the spare parts distribution system's responsiveness. The authors conclude that the Army must either increase the responsiveness of its logistics structures or invest inordinate amounts in inventories to prevent losses in combat capability.

R-3678-OSD/AF/A/RC The Nicaraguan Resistance and U.S. Policy: Report on a May 1987 Conference. D. F. Ronfeldt, B. Jenkins. 1989.

This report presents the results of a 1987 RAND conference on the Nicaraguan Resistance and U.S. Policy Implications. The conference, part of RAND's Western Hemisphere Forum, included presentations on (1) background of the resistance and U.S. support for it, (2) the strategic poverty of the Reagan Administration's vision regarding Nicaragua, (3) the Nicaraguan resistance in transition, (4) Sandinista strategy, and (5) diplomatic-political options in Nicaragua. The conference participants had varied backgrounds in official diplomatic and military capacities and in political activism, policy analysis, or policy-oriented research.

R-3691-A Families in the Army: Looking Ahead. P. A. Morrison, G. Vernez, D. W. Grissmer, K. McCarthy. 1989.

This study considers how aggregate demand for Army family services will change in the future and identifies long-range issues posed by the changes in Army families. The Army will be drawn further into the realm of family concerns that Army personnel themselves face because (1) the "early" pattern of Army family formation and growth will continue to compress family-related needs into the early years of Army service; (2) the changing division of labor within families will generate competing obligations to the Army and to one's family members; and (3) the growing orientation toward paid employment among younger generations of Army spouses foreshadows a growing demand for day care, Army assistance in lining up jobs, and diminished flexibility in traditional volunteer activities. The number of Army family dependents will likely decline, not increase, between 1985 and 2000, although Army actions and policies could potentially modify that future. Four long-range issues deserve closer study and continued monitoring: (1) employment opportunities for Army spouses, (2) the growing proportion of women among single parents, (3) readiness, and (4) potential "hidden" effects of Army practices and policies.

R-3702-A The Concept of Operations for a U.S. Army Combat-Oriented Logistics Execution System with VISION (Visibility of Support Options). R. Tripp, M. B. Berman, C. L. Tsai. 1990.

This report describes a concept of operations for a decision support system intended to assist field- and wholesale-level logisticians to prioritize repair and distribution actions for high-technology reparable items. The system recognizes that uncertainties will cause imbalances between requirements for high-tech components and their availability in both peacetime and wartime and enables logisticians to adjust their actions to compensate for unanticipated events. The system maximizes the probability of achieving specific weapon system availability goals over a given short-term horizon with available resources. Initial investigations have shown that a logistics system that couples responsive repair and distribution capabilities with such a decision support system could significantly improve weapon system availability over the current system using the same amount of stock and repair resources. The Army has developed plans to field-test the concept, which it refers to as the Readiness-Based Maintenance System (RBMS). RBMS has been incorporated as an element of the Strategic Logistics Program, which is aimed at modernizing the Army's Logistics Information Systems.

R-3726-A East Germany's Contribution to the Warsaw Pact (U). K. Crane. 1989. SECRET NOFORN WNINTEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This report assesses the current and future contribution of the East German armed forces to the Warsaw Pact and attempts to determine whether their role in the Pact has changed in recent years. The study assesses the veracity of East German military spending figures and estimates costs of personnel, procurement of military durables, and arms trade. It compares East German military capabilities with those of the Group of Soviet Forces—Germany, Czechoslovakia, and Poland—and finds that, with the exception of the East German navy, rates of modernization in these forces have either exceeded or kept pace with those in East Germany. The report also estimates military manpower needs and compares them with demographic projections of 18-year-old cohorts. The study finds that East Germany will be unable to sustain current force levels with present terms of enlistment. The study also assesses East Germany's ability to sustain or increase current military expenditure levels in the 1990s and finds that the East Germans will have difficulty in increasing expenditure levels at past rates. The study concludes with a set of policy recommendations for conventional arms negotiations.

R-3726/1-A East Germany's Military: Forces and Expenditures. K. Crane. 1989.

This report assesses the current and future contribution of the East German armed forces to the Warsaw Pact and attempts to determine whether their role in the Pact has changed in recent years. The study assesses the veracity of East German military spending figures and estimates costs of personnel, procurement of military durables, and arms trade. It compares East German military capabilities with those of Czechoslovakia, Poland, and the Group of Soviet Forces Germany, and finds that with the exception of the East German navy, rates of modernization in these forces have either exceeded or kept pace with those in East Germany. The report also estimates military manpower needs and compares them with demographic projections of 18-year-old cohorts. The study finds that East Germany will be unable to sustain current force levels with present terms of enlistment. The study also assesses East Germany's ability to sustain or increase current military expenditure levels in the 1990s and finds that the East Germans will have difficulty in increasing expenditure levels at past rates. The study concludes with a set of policy recommendations for conventional arms negotiations.

R-3734-A/AF British Military Requirements, Resources, and Conventional Arms Control. J. E. Nation. 1990.

British military leaders face a formidable challenge in the next 15 years as they modernize their forces. The financial requirements of modernization efforts will be large, especially since replacement equipment is almost always more expensive than its predecessors. Modernization requirements will be substantial, even with conventional force reduction agreements that cut forces deeply. Other factors complicate Britain's military modernization efforts: Demographic pressures will probably make recruiting Britain's all-volunteer force both more difficult and more costly. In turn, increasing personnel costs may reduce defense resources available for investment and jeopardize the acquisition of replacement equipment. A reduced Warsaw Pact threat will also probably reduce defense resources. This report compares the financial requirements of achieving British modernization goals with a range of projected budgetary resources. The financial requirements of major equipment production with projected resources are estimated in two cases: in the absence of conventional arms control in Europe, and following a Conventional Forces in Europe (CFE) agreement.

R-3760-AF/A/OSD Onward Through the Fog: Uncertainty and Management Adaptation in Systems Analysis and Design. J. S. Hodges, R. A. Pyles. 1990.

Policy analysis has always involved great uncertainty. Tools have been available for handling some of that uncertainty, but policy analysis work in many fields has fallen into stereotyped problem formulations and analytical approaches. In particular, treatments of uncertainty are typically incomplete and often conceptually wrong. This report argues that these shortcomings produce pervasive systematic biases in analyses. It describes and discusses the common mode of policy analysis and identifies its two main shortcomings—omission of crucial sources of uncertainty and neglect of systems' ability to respond to the unexpected. It categorizes some varieties of uncertainty relevant to policy analysis and presents examples of ways they are commonly represented. Finally, it discusses designing and evaluating systems, and presents a collection of generic strategies for uncertain situations.

R-3761-A Understanding Commanders' Information Needs. J. P. Kahan, D. R. Worley, C. M. Stasz. 1989.

Based on observations of Army Group, corps, and division command posts in action over 12 different exercises and on interviews with a variety of military experts (including doctrine writers and former commanders), this report discusses the information needs of commanders of higher-echelon Army units. The authors attempted to determine the reasons commanders and staff communicated information and to clarify the intended uses of that information. They identified three different modes of command-post-level communication—pipeline, alarm, and tree. Each mode is indicative of a different communication relationship between a commander and his staff, and each places different demands on the command-and-control operating system. To fulfill commanders' information needs, the authors recommend a number of education and training measures: (1) institutionalize back-briefing, (2) teach process as well as procedures, and (3) train unit command staffs to share images. As for the design of information systems, they recommend that the Army (1) identify means of more direct image sharing, (2) build a hybrid information system, and (3) establish an end-user to end-user communications orientation.

R-3768-A Developing Robust Support Structures for High-Technology Subsystems: The AH-64 Apache Helicopter. M. L. Robbins, M. B. Berman, D. W. McIver, W. E. Mooz, J. Schank. 1991.

Using data on the high-technology subsystems of the AH-64 Apache attack helicopter, this report hypothesizes five alternative logistics structures (two traditional ones that rely on conventional depot support of intermediate repair and three that focus on more responsive support) and evaluates them in terms of comparative cost-effectiveness and robustness. The study found that the responsive support alternatives featuring Special Repair Activity (SRA) support of critical items or fast-turnaround continental U.S. (CONUS) depots tied to the theater by assured rapid transportation offer a means for providing cost-effective support of the Apache in a variety of conditions. The research substantiates previous RAND research on the M-1 tank that argued that the Army must increase the responsiveness in its logistics structures or face a loss in combat capability. (See also R-3673, R-3793)

R-3771-AFMIC Terrorists and the Potential Use of Biological Weapons: A Discussion of Possibilities. J. Simon. 1989.

This report considers the potential for terrorists to use biological weapons. It discusses the implications of recent trends in terrorism for the future use of biological agents and the reasons terrorists might be motivated to use them. It then identifies several constraints that inhibit terrorists from venturing into this new type of conflict and the factors that could break down these constraints. Finally, it establishes some broad characteristics that could identify the types of terrorist groups that might be more likely than others to use biological weapons. The findings suggest that, since the technological, logistical, and financial barriers to the use of biological agents are not insurmountable, a key determinant in the potential use of such agents will be the willingness of terrorists to engage in this new type of violence. Therefore, efforts to improve intelligence regarding terrorist group strategies and capabilities will become increasingly critical in the future.

R-3793-A Supporting Combined-Arms Combat Capability with Shared Electronic Maintenance Facilities. W. G. Wild. 1990.

The U.S. Army shows signs of shifting away from using "weapon-system-specific" test diagnostic equipment and toward using more broadly capable versions that can isolate faults within subsystems and components from a number of different weapon systems (e.g., the proposed integrated family of test equipment, IFTE). As a result, weapon systems that once had uncontested access to specialized test equipment will now be relying on a common facility, and, hence, their availabilities become linked. This study focuses on two systems—the M1 tank and M2/M3 Bradley fighting vehicle—that are linked through a common reliance on direct support electrical systems test set (DSESTS) test equipment. The author finds that greater weapon system availability and more robust support may be attainable at constant cost by emphasizing resources that are fungible across weapon systems, such as test equipment and improved theater transportation for selected high-priority items. The report also demonstrates a multiple weapon systems methodology that is instrumental in identifying such potential improvements.

R-3794-A Decision Support for the Wartime Theater Ammunition Distribution System: Research Accomplishments and Future Directions. J. Schank, B. Leverich, J. Paul. 1990.

Flexible and responsive management systems can allocate limited logistic resources in ways that maximize combat capability. This research identified uncertainty and complexity as the key problems facing the management of the wartime theater ammunition distribution system. Early in the study, three research areas were identified: a system data model should be developed, a quantitative evaluation mechanism was required, and narrow-purpose expert systems could improve decision support. A prototype knowledge-based simulation creates models of material management centers, movement control centers, and other ammunition managers. A method was developed to identify decisionmaking problems appropriate for expert system solutions. Questions concern whether a problem is appropriate, whether the development of an expert system is feasible, and whether expert system developments can be justified. The authors noted a need for developing expert systems in domains where knowledge is scarce and building a portable and extensible laboratory environment for training and evaluation purposes.

R-3795-A Evaluating Intelligence Systems That Support Deep Fires. F. A. Camm, N. Z. Shapiro, R. H. Anderson, J. J. Gillogly, J. L. LaCasse, M. LaCasse. 1989.

Current U.S. Army doctrine emphasizes the importance of extending command emphasis to include not just the close battle but the deep battle. It calls for the use of Deep Fires and maneuver to exploit the deep portion of the battlefield. This report presents an analytic approach that could simulate the development of combat intelligence about the deep battlefield and compare the performance of alternative intelligence systems to support Deep Fires. It emphasizes the development of intelligence products that the Army could use to support the Army tactical missile system in a Central European war in the mid-1990s. It draws on observations of combat intelligence activities during several U.S. and NATO command-post exercises in Germany from 1986 to 1988 and on Army-approved European scenarios and Army combat and intelligence collection models to provide inputs to the simulation of the intelligence system as a whole. The analytic approach presented here employs a set of new techniques for modeling the quality of information in an intelligence system. It uses simple Bayesian logic to develop a high-level view of intelligence processing and realizes it in a flexible, parameterized, rule-based network model.

R-3814-A Performance-Oriented Logistics Assessment (POLA): Users' Manual for the Logistics Decision Model (LDM), Version IV. J. H. Bigelow. 1992.

This report is a user's manual for the Logistics Decision Model (LDM), which was developed by the Performance-Oriented Logistics Assessment (POLA) project to help build the logistics portion of the Army five-year program. POLA estimates the effects on combat performance of alternative investments in logistics resources. LDM simulates the ways that Red and Blue combat forces are influenced by combat service support capacities (e.g., transportation, ammunition handling, maintenance) and logistics resources (e.g., stocks of ammunition, war reserve equipment, replacement personnel). By itself, LDM cannot do all that is required of the POLA methodology. It can estimate the effect on combat performance of varying the capacities to perform certain logistics functions, such as ammunition handling, but those capacities must be estimated from physical resources. LDM reads data from four different types of input files: the ATTRITION file contains data that relate the outcomes of combat to the numbers and kinds of weapons engaged; the SUPPORT files describe the structure and activities that support the combat forces; the TIME PHASE file specifies the amount of each resource that enters the simulation; and the OUT SPEC files specify what variables appear in the output files. LDM contains two modules that perform computations: the support module computes the rates of all activities performed by the theater support structure to make weapons available for combat, and the combat module computes the outcomes of combat between the available Blue and Red weapons. Activities (and many combat outcomes) are defined by their effects on resources, such as consumption, production, or transport. (See also R-3823, N-3354, N-3393.)

R-3816-A Implementing the Battle Command Training Program. J. P. Kahan, D. R. Worley, S. M. Holroyd, L. C. Pleger, C. M. Stasz. 1989.

This report presents the results of a RAND study examining the implementation of the U.S. Army's Battle Command Training Program (BCTP), which consists of three phases: a five-day Battle Seminar of workshops and decision exercises, a week-long computer-driven command post exercise (called the WarFighter Exercise) three to six months after the seminar, and a take-home Sustainment Exercise four to six months after the WarFighter Exercise. The report examines the BCTP based on the common understanding between the BCTP and its clients about its purposes, methods, and evaluation criteria, and on the data collection and analysis strategies required of the BCTP to provide feedback to client units and to higher-echelon doctrinal and readiness agencies. The authors make recommendations designed to increase the BCTP's ability to improve Army training both in terms of short-term issues of individual division readiness and long-term issues of higher-echelon command and control.

R-3823-A Performance-Oriented Logistics Assessment (POLA): Executive Summary. J. H. Bigelow. 1992.

Performance-Oriented Logistics Assessment (POLA) has developed a prototype methodology to help build the logistics portion of the Army five-year program. The POLA methodology estimates both the costs and the effects on combat performance of alternative logistics improvements. By comparing their costs and effects on combat performance, one can arrive at a balanced program that provides greater combat effectiveness for each logistics dollar spent. This report briefly reviews the POLA methodology and its uses. (See also R-3814, N-3354, N-3393.)

R-3841-A/AF West German Military Modernization Goals, Resources, and Conventional Arms Control. J. E. Nation. 1991.

This report compares the financial requirements of modernizing West German military forces with a range of budgetary resources both with and without negotiated conventional force reductions in Europe. The analysis focuses on the evolution of economic and demographic constraints on long-term West German defense planning, projects resource-requirement imbalances, and examines potential reactions to imbalances. The author concludes that reactions by Ministry of Defense (MoD) planners will vary depending on the emerging security environment and the results of West Germany's security debate. If substantial shortfalls appear likely, planners may be forced to make difficult choices, ranging from stretching out procurement purchases to making large personnel reductions and abandoning specific missions. However, MoD plans will probably be influenced more by changes in Soviet and Warsaw Pact member defense efforts.

R-3882-A The Army in a Changing World: The Role of Organizational Vision. J. K. Setear, C. H. Builder, M. D. Baccus, E. W. Madewell. 1990.

This report is about the Army's future and the role an organizational vision for the Army can play in that future. The authors suggest that for an Army that wishes to adapt to the changing national security planning environment, the key element is the Army's vision of itself, its sense of identity and purpose, of what it is and what it is about. While the Army's essential institutional planning problem over the past 40 years has largely been one of managing budget, personnel, and technological resources, the problem for the future may involve reconceiving the Army to meet new threats to the nation's security or to minimize institutional damage. Although the Army has no explicitly acknowledged current organizational vision, its institutional thoughts and actions do reflect a widely shared sense of identity and purpose as the ready armored defender of Central Europe. If the authors projections of planning trends materialize, this current vision puts the Army on a collision course with what is perceived as its post-Cold War future. A fundamental choice may have to be made between the Army's current combat role and its

former historical role as a provider of noncombat military services to the nation. Of the eight alternative visions of the Army that the authors pose, they believe the most relevant and realistic ones call for a U.S.-based Army performing general military service that may rely on either active or reserve forces.

R-3884-A Army Families and Soldier Readiness. M. A. Burnam, L. S. Meredith, C. D. Sherbourne, R. B. Valdez, G. Vernez. 1992.

During the 1980s, Army families became more diverse and complex, paralleling trends in the civilian world. As these changes have developed, Army families have called for improved family and quality-of-life programs. The Army leadership has expressed concern that family needs, if unmet, could reduce soldiers' readiness, retention, and overall well-being. To determine how extensive such needs are, and how much they are affected by family characteristics and Army policies, this study collected quantitative data relevant to Army family policy, focusing on three key areas: soldiers' individual readiness, their use of family services, and their overall well-being. The analyses confirm that long working hours, frequent rotations, frequent separations from family, overseas location, and assignment to a nonpreferred location have negative impacts on individual readiness and well-being. The authors found a strong relationship between favorable perceptions of Army leadership and practices on the one hand, and readiness and individual well-being on the other. Perceptions of Army support and of the necessity of Army requirements are also associated with retention for officers and with Army commitment and job performance for all soldiers. (See also R-3691, N-2624)

R-3899-A/DARPA Terminally Guided Submunition Technology and Countermeasure Issues (U). M. B. Schaffer. 1991. SECRET NOFORN WNINTEL LIMITED: US GOV'T AGENCIES INTEL OTHER REQUESTS MUST BE REFERRED TO DARPA/TIO

R-3901-A Effect of Personnel Quality on the Performance of Patriot Air Defense System Operators. B. R. Orvis, M. T. Childress, J. M. Polich. 1992.

This report examines the linkage between the quality of enlisted personnel (in terms of aptitude score) and their ability to operate the Patriot air defense missile system. The intent was to help the Army set appropriate performance standards and estimate the effects of personnel quality on operational performance. The study finds that the Armed Forces Qualification Test (AFQT) score has a direct, consistent effect on the outcomes of air battles, both in terms of knowledge assessed by written tests and in actual performance simulations. Specifically, soldiers with higher AFQT scores can be expected to suffer significantly less asset damage, destroy more hostile aircraft, and be more effective in missile conservation. The study also finds that a one-level change in AFQT category equaled or surpassed the effect of a year of operator experience or of frequent training, a finding that has significant readiness and cost implications, since higher quality soldiers require less training and operator experience. Finally, the study finds that next to AFQT, operator and unit experience are the factors that most consistently affect performance.

R-3914-A Contributions of Laser Weapons to the Survivability/BMD Potential of Strategic Defense Systems (U). M. D. Miller, H. G. Hoover, S. M. S. Everingham. 1992. SECRET LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT

(U) This report, representing work done between 1988 and 1990, compares architectural variants for ballistic missile defense (BMD) concepts based on two weapon technologies: space-based interceptors (SBI) and space-based lasers (SBL). The SBI element of these architectures consists of orbiting platforms called carrier vehicles (CVs). Each CV carries a number of kinetic-energy kill vehicles (KV) and achieves its kills by impact with missiles. The SBL element consists of high-energy laser weapons that kill targets by laser energy. Although SBI-only and SBL-only forces are considered, the study concentrates on a layered architecture that involves both elements. All architectures are assumed subject to enemy defense suppression efforts by ground-based anti-satellite (ASAT) weapons launched as an immediate precursor to a massive intercontinental ballistic missile (ICBM) attack against the United States. The authors compare defense concepts on the basis of their residual BMD capability during the boost and post-boost phases of the ICBM attack. Adopting a "max-min" approach, they assume that the enemy times his ASAT/ICBM launch to minimize this residual capability and that the defense, recognizing this possibility, will have configured its constellations to maximize this minimum.

R-3947-A The Army's Role in Counter-insurgency and Insurgency. S. T. Hosmer. 1990.

This report identifies potential initiatives for improving Army doctrine and capabilities for counterinsurgency and insurgency warfare. These include recommendations that the Army (1) build and maintain small cadres of counterinsurgency and insurgency experts; (2) create, along with the other services, a counterinsurgency institute to train U.S. and foreign nationals; and (3) ensure more appropriate and effective U.S. arms and equipment transfers to countries facing insurgent threats. The author also examines the reasons insurgency is likely to continue to be a frequent form of conflict; describes the threat of insurgency to important U.S. interests in the Third World; explores the potential for U.S. Army noncombat support to Third World countries fighting insurgency; describes the impediments to U.S. influence and assistance; outlines the potential situations that might lead to U.S. involvement in counterinsurgency combat; and discusses the Army's role in support of friendly insurgency.

R-3951-A Gorbachev's First Five Years in the Soviet Leadership: The Clash of Personalities and the Remaking of Institutions. H. Gelman. 1990.

This report provides an overview of the dilemmas that arose from Gorbachev's efforts to change the Soviet Union during his first five years in power. The study seeks to show how the conflicts in various arenas of Soviet life have affected each other. The author reviews the struggle among the Soviet leaders from the spring of 1985 through the spring of 1990. Because the economic dimension is probably the decisive one, the report first traces how and why the Soviet leaders arrived at their present economic predicament. The study then reviews the purely political aspects of the leadership struggle as it evolved and the implications of Gorbachev's emerging political reforms. It discusses the main features of the nationality crisis as they affected Gorbachev. The study then considers the evolution of Gorbachev's relations with the military and their institutional consequences. Finally, it weighs the implications of the political role of the KGB for the Gorbachev leadership.

R-3967-A An Evaluation of the VISION Execution System Demonstration Prototypes. P. Boren, K. Isaacson, J. Payne, M. L. Robbins, R. Tripp. 1991.

This report describes the prototype development for a U.S. Army combat-oriented logistics execution system with VISION (Visibility of Support Options). The Army calls this system the Readiness-Based Maintenance System (RBMS). RBMS prioritizes repair and distribution of spare parts by maximizing the probability of meeting unit-level weapon system availability goals. The report discusses the feasibility, effectiveness, and usability of RBMS through the use of analytic demonstration prototypes. It outlines the methodology behind RBMS and describes the outputs it produces. It then presents findings on RBMS's potential value for the Army, describes the input data requirements and the availability of usable data in present Army data systems, and discusses evaluation results of the demonstration prototypes. Finally, the report presents prospective users' evaluations of the perceived usefulness of the system and suggestions for its improvement.

R-3968-A The VISION Assessment System: Class IX Sustainment Planning. C. L. Tsai, R. Tripp, M. B. Berman. 1992.

This report describes the underlying motivation, characteristics, and possible applications of the VISION (Visibility of Support Options) Assessment System, a decision support system designed to improve the ability of Army logisticians to address three issues that are fundamental to Class IX (spare parts) sustainment planning: (1) assessing whether the logistics system can support operational needs and objectives throughout the course of a planned conflict, (2) determining where and when problems are likely to emerge and how serious they are likely to be, and (3) identifying what can be done beforehand to avoid or mitigate those potential problems. Among the potential uses of the VISION Assessment System, the authors identify (1) assessing and improving the supportability of existing operation plans (OPLANs), (2) evaluating and choosing among alternative courses of action during OPLAN development, (3) identifying effective peacetime strategies for overcoming potential wartime problems, (4) examining new concepts and establishing new doctrine, (5) exploring cost-reduction strategies and weighing tradeoffs among different resources, and (6) reporting unit sustainability.

R-3997-DR&E/A/AF Joint Close Support Study: Final Report (U). M. Callero, B. W. Don, F. L. Frostic. 1993. SECRET LIMITED: US GOV'T AGENCIES & CONTRACTORS

(U) This report provides high-level decisionmakers with a framework for analyzing and addressing close support issues from a combined arms perspective at all levels of combat. The report's key finding is that because the situations that require support for engaged land forces extend beyond the limits of close support and because the demands of the battlefield require that forces and systems be applied in a variety of ways, force enhancements to improve the close support capability should be viewed as enhancements to the general-purpose forces. The report concludes with some specific recommendations for the Army and the Air Force and argues that for these recommendations to be carried out, the nation's investment would best be managed by making improvements on a "package" basis, rather than to the systems separately. The report also argues that the changing nature of the battlefield, the increasing employment range and flexibility of close support systems, and the ability to jointly share information about enemy force and logistics movements over great distances require that the doctrine and employment concepts for the support of engaged ground forces be modified to reflect these changes.

R-3998-A Lessons for Contemporary Counterinsurgencies: The Rhodesian Experience. B. Hoffman, J. M. Taw, D. W. Arnold. 1991.

This report examines the counterinsurgency campaign waged by Rhodesia between 1965 and 1980. Its purpose is to analyze the lessons learned from the Rhodesian conflict and assess the relevance of these lessons both to United States low-intensity-conflict training and doctrine and to the insurgencies occurring at this time in Central America. The research concentrated on the four areas common to most insurgencies: (1) security force organization and attendant command-control-communication issues; (2) countermeasures to suppress urban terrorism; (3) rural pacification and security; and (4) intelligence collection, collation, and dissemination. The greatest challenge facing the U.S. Army in evolving a credible and coherent low-intensity-conflict doctrine today is overcoming the institutional barriers that inhibit change and adaptation. The Army must adjust its dominant conventional war-fighting mindset to the vagaries and

complexities of warfare at the low end of the conflict spectrum.

R-4001-A The Fate of the Party Apparatus Under Gorbachev. M. Rush. 1991.

For most of its history, the Soviet political system has been dominated by the Communist Party's permanent staff—the party apparatus, or apparat. The apparat has been charged with executing such vital functions as managing the party apparatus itself, and recruiting persons with the requisite skills and political loyalties; controlling other institutions of the regime, choosing their leaders, and checking on their performance; servicing the Politburo, alerting it to the need for policy decisions, and drafting the directives required to activate the relevant institutions; and monitoring these massive and recalcitrant bureaucracies and ensuring that the party's directives are implemented. The apparat's performance in carrying out these functions is indicated by the sad state of the Soviet Union when Gorbachev became head of the party apparatus, the General Secretary, in 1985. In the following five years, Gorbachev moved from a concern with revitalizing the apparat to enable it to perform its traditional functions more effectively to a concern with emancipating the legislative and executive "branches" of the Soviet government from heavy-handed party control. This report traces Gorbachev's effort and assesses its consequences.

R-4002-A The Ethnic Factor in the Soviet Armed Forces: The Muslim Dimension. T. S. Szayna. 1991.

Open ethnic conflict has swept the entire Soviet Union during the last few years. The Muslims already have had a powerful negative impact on the efficiency of the Soviet military. This report examines the Muslim dimension of the ongoing ethnonational ferment affecting the Soviet armed forces. In particular, it analyzes the impact of the rapidly increasing Muslim cohort on the cohesion of the Soviet military by focusing on factors affecting the ability and reliability of Muslim servicemen today. Problems such as language deficiencies, trainability, and socialization are discussed in detail, as are efforts by the military leadership to ameliorate them. The author critiques some earlier methods for dealing with the subject and considers the implications of the ethnic ferment for armed forces reform.

R-4015-A Defense Policy and Low-Intensity Conflict: The Development of Britain's 'Small Wars' Doctrine During the 1950s. B. Hoffman, J. M. Taw. 1991.

This report examines the planning and conduct of three counterinsurgency campaigns waged by Great Britain in Malaya, Kenya, and Cyprus during the 1950s. Certain mistakes were repeated in each conflict, from which the following lessons can be drawn: (1) the administration, police, and military should be coordinated under a single individual; (2) intelligence gathering and collation should be coordinated under a single authority; (3) late recognition of an insurgency is costly; (4) large-scale formal operations should not be emphasized in lieu of special forces operations; (5) routine police work should continue; and (6) without sufficient low-intensity-conflict training for troops and appropriate materiel, the conflict will last longer and cost more. The authors point out that situational factors must be considered in an insurgency; also critical is the nature of the insurgency, especially the broadness of its appeal.

R-4021-A German Unification and Its Ramifications. R. D. Asmus. 1991.

This report assesses the political, economic, foreign, and security policy implications of German unification and draws the central conclusion that unification has fundamentally transformed Germany's position and role in Europe. The author identifies four dangers facing German policymakers: (1) residual uncertainties of German domestic politics in the wake of unification; (2) the possibility that Germany will not engineer its political and economic integration into the European Community as quickly or as comprehensively as it hopes; (3) the chance that Germany will be overwhelmed by the problems of political and economic reconstruction farther to the east; and (4) Germany's need to develop and sustain a satisfactory relationship with the Soviet Union when the Soviet state is fragmented. The U.S. role in Germany and Europe will not be one of a controller or mentor, but rather one of a key leadership partner in the Western world; the United states will be a key interlocutor with the Soviet Union on security issues.

R-4071-A Arms Control Regimes and Ballistic Missile Defense. M. D. Miller, H. L. Weisberg, W. R. Harris, S. M. S. Everingham, K. J. Hoffmayer, H. G. Hoover, B. Wolf. 1991.

This study (1) examines arms control agendas that include substantial roles for ballistic missile defense (BMD) and (2) arms control architectures that would support such agendas. It reviews the national security objectives that pertain to strategic offensive and defensive forces and then describes a spectrum of six candidate arms control/BMD agendas, two of which—thin-area BMD and defense dominance—are identified as having enhanced potential to fulfill national security objectives without significantly degrading strategic stability. The report also determines, for ground- and spaced-based thin-area BMD architectures and a base case set of threats, the weapon deployment levels required to provide various degrees of threat negation capability. It also considers the role of arms control treaties in achieving a thin-area BMD within the framework of U.S.-Soviet cooperation. Finally, it discusses cooperative deployment of thin-area BMD within a broad context of goals for a structured strategic defense program.

R-4074-A Strategic Planning for the United States Army Personnel Function. W. M. Hix, R. E. Sortor. 1991.

This report reviews and evaluates how much strategic planning concepts used in private industry can be applied

to the Army and provides recommendations for improving the Army's ability to do effective strategic planning for a changing and uncertain future. The study recommends that the Army adopt a process patterned on the private industry model because, unlike the Army process, the latter process explicitly considers future uncertainty and evaluates strategy alternatives to deal with it. The process for the proposed strategic planning concept should start by defining and prioritizing goals and objectives. It should then define relevant dimensions of the operating environment and explore alternative future environments. Finally, the process should develop strategies (shaping, operating, and hedging) and define the resulting environment within which the Army plans to operate. The study further recommends that the revised process be implemented incrementally over the next two-year planning cycle.

R-4084-A NATO's Future Conventional Defense Strategy in Central Europe: Theater Employment Doctrine for the Post-Cold War Era. R. L. Kugler. 1992.

This report provides a political-military analysis for thinking about how NATO's conventional defense strategy can be adjusted to contribute to stability in Central Europe in the coming post-Cold War era. The report (which was assembled in early 1991) concludes that NATO will need to employ a new "theater employment doctrine"—the way NATO uses military force on the battlefield to attain its goals—one that defends further eastward and more flexibly than linear defense contemplated. All viable alternatives for such a doctrine will require NATO to uproot long-established defense practices. Changes will have to be made not only in NATO's force posture, but also in how coalition defense is conducted. Having a concerted planning effort that forges a coherent relationship among NATO's future defense strategy, employment doctrine, and force posture can ensure these changes are well-managed, thus leaving NATO with a viable conventional defense strategy even if forces are smaller than they are now.

R-4097-A Enlistment Effects of the 2 + 2 + 4 Recruiting Experiment. R. J. Buddin. 1991.

This report describes the enlistment effects of the Army's 2+2+4 recruiting experiment, which was aimed at attracting high-quality personnel into the active Army and encouraging their later participation in the reserves. These effects were estimated through a job-offer experiment that estimated how the program affected the recruits' choices among skills and terms of service and through a geographic experiment that assessed whether the program led to a "market expansion"—i.e., an increase in the total number of high-quality persons entering the active Army. Overall, the program seems to have accomplished its objectives for active-duty recruiting. The 2+2+4 option sold readily and benefited virtually all the occupational specialties for which it was tested. During the test, about 7 percent of all male high-quality enlistments contracts were written under the program. Moreover, the analysis indicates that the program attracted high-quality recruits into the Army and caused only a small number to change from a longer term of service to a shorter one. (See also R-2935, R-3353, N-3187.)

R-4108-DARPA/A/DR&E The Relevance of Deep Fires and Associated Countermeasures in Regional Conflict (U). M. B. Schaffer, K. A. Solomon, G. I. Taylor. June 1992. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

R-4114-AF/A/OSD Is It You or Your Model Talking?: A Framework for Model Validation. J. S. Hodges, J. A. Dewar. 1992.

This report lays out a conceptual framework for validation, arguing that some models can be validated and used to predict, while others cannot be validated and may only be put to nonpredictive uses. To be validatable, a model must be observable and measurable, must exhibit constancy of structure in time, must exhibit constancy across variations in conditions not specified in the model, and must permit the collection of ample data. Nonvalidatable models can be used as a bookkeeping device, as an aid in selling an idea of which the model is but an illustration, as a training aid to induce a particular behavior, as part of an automatic management system whose efficacy is not evaluated by using the model as if it were a true representation, as an aid to communication, as a vehicle for a fortiori arguments, and as an aid to thinking and hypothesizing. The report shows that the appropriate form of model quality assurance depends fundamentally on how the model is used.

R-4133-A/USN Improving Naval Aviation Depot Responsiveness. M. K. Brauner, D. A. Relles, L. A. Galway. 1992.

This report examines the consequences of increasing the Navy depot's role in the logistics system by directing its resources toward the day-to-day needs of the fleet. Using a simulation that examined whether mission capability could be improved during a 90-day war through some combination of responsive stock management, proactive use of depot repair capabilities, and shortened transportation pipelines between carriers and depots, we found that priority repair at the depot can make on important difference in mission capability, that shortened pipelines can have large effects on mission capability, and that constructing an aviation consolidated allowance list (AVCAL) based on aircraft availability goals may offer promise for maximizing aircraft availability per dollar spent. The study also concluded that data synthesis is a missing ingredient in the Naval aviation logistics management system that inhibits the depot's ability to react quickly in support of sudden demand peaks.

R-4143-A Effect of Aptitude on the Performance of Army Communications Operators. J. D. Winkler, J. C. Fernandez, J. M. Polich. 1992.

This report examines duty tasks performed by military occupational specialty 31M, Multichannel Communications Equipment Operator, whose members operate communications systems providing division- and corps-level command and control. The intent was to develop quantitative analyses based on objective measurement of soldier and unit performance aimed at improving the Army's ability to set appropriate performance standards and to develop quantitative estimates of the link between personnel aptitude and Army operational performance. The study finds that the Armed Forces Qualification Test (AFQT) score has a direct, consistent effect on the ability of communications personnel to provide effective battlefield communications to Army units. The evidence suggests that AFQT scores have a sizable effect on group performance. Groups that are on average "smarter" outperform other groups. The study concludes that a lowering of accession standards will substantially reduce the probability of operator success in operating and troubleshooting communications systems.

R-4155-AF/A Evolution of Models at the Warrior Preparation Center: Problems and Solutions for Higher-Echelon Exercises. P. D. Allen. 1993.

This report describes the evolution of the suite of models at the Warrior Preparation Center (WPC), a training and support facility in Europe. The study points out that the WPC faced a sudden change in its customer base, which meant that underlying assumptions and exercise designs well suited for that earlier customer base had to be reevaluated. This reevaluation yielded two results: (1) the WPC should strive to reduce in-house model development and model modification and should focus instead on improved training support activities; and (2) the WPC should initiate a new investigation of alternative models and exercise designs without the old institutional assumptions. This result led to the decision that the WPC should have two sets of models-one for Army Group and above and another for Army Group and below. The project staff recommended the Corps Battle Simulation (CBS) model to replace WPC's ground war simulation (GRWSIM) model for lower echelon exercises and the joint theater-level simulation (JTLS) model for higher-echelon training.

R-4156-A Simulation Support of Large-Scale Exercises: A REFORGER Case Study. P. D. Allen. 1992.

This report describes an analysis of the Caravan Guard (CG) 89 and Centurion Shield (CS) 90 exercises. The study examines four different exercise training modes (both live and simulated) employed in CG 89 and CS 90 exercises: field training exercise, command field exercise, command post exercise; and computer-assisted exercise. The analysis leads to three recommendations for future large-scale multi-echelon exercises. First, exercises should consist of a single training mode and that should be simulation. Second, if simulations become the primary mode, a number of limitations affecting the current family of simulations must be overcome. Broad areas needing improvement include the representation of the effect of combined arms, the types of battles, aspects of how the operational level of war is depicted, the "fog and friction of war," and intelligence functions and products. Third, whenever possible, exercises should include both Active and Reserve component units and forces and other services and nations.

R-4172-A Assumption-Based Planning for Army 21. J. A. Dewar, M. H. Levin. 1992.

This report describes a long-range planning methodology developed for Army 21-an Army planning exercise designed to envision how the Army will fight between 15 and 30 years in the future-and demonstrates a partial implementation of the methodology by generating a set of alternative futures. In applying the methodology to the AirLand Battle-Future (ALB-F) concept, we found that the scenarios generated can be properly used to do two things: think about actions that should be taken in current planning to begin preparing for the eventuation of any of the scenarios, and identify "signposts"-events or trends that would suggest the world had taken an important turn toward one of the challenges to the ALB-F concept. We also found the methodology could be improved by developing a rudimentary theory of assumptions to guide their discovery and formulation. Finally, we found the ALB-F concept to be robust because it was difficult to come up with assumptions underlying it that might be violated; such a finding implies that doctrine writers will be challenged to develop the concept into a compelling guide to force structure development, training, etc.

R-4177-A "An Ever Closer Union": European Integration and Its Implications for the Future of U.S.-European Relations. J. B. Steinberg. 1993.

This report examines the process of European integration and assesses its implications for U.S. policy. The study finds that changes in the European Community (EC) will be evolutionary, with the economic and financial dimension moving more quickly and the foreign policy and defense dimension moving more slowly. It also concludes that U.S. influence over European policy will diminish as Europeans become more preoccupied with developing intra-EC consensus, that conflicts in the economic realm will continue and could worsen if the United States and the EC move away from an open trading and financial system to a bloc economic approach, and that NATO will play a diminished role in transatlantic policy consultation and coordination, but will remain an important element of the European security structure. The document recommends that the United States adopt a policy of supporting the general thrust of the integrative process, develop more extensive bilateral working relationships with EC institutions on both economic and security policy, support NATO reform to enhance the complementarity of the EC and NATO, and advocate broadening the EC to include Central European and East European countries.

R-4182-A An Initial Evaluation of the VISION Assessment System: Its Relevance and Application to National-Level Sustainment Planning. C. L. Tsai, P. Boren, R. Tripp. 1992.

This report documents the demonstration of a prototype decision support system for logisticians called the VISION Assessment System, or VAS. The system aims at helping logistics planners evaluate and improve equipment sustainability. To demonstrate the prototype, we developed a scenario involving M1 tanks similar to one that occurred during the buildup phase of Operation Desert Shield. In addition to the standard support concept, we evaluated three other strategies designed to improve tank availability: expedited requisitions, forward-deployed depot repair, and asset prioritization. The evaluation indicated that under the standard support concept the number of operational tanks would decline to unacceptably low levels and that each enhancement strategy improved things, albeit not always to the extent anticipated. Beyond demonstrating that the prototype could address logistical questions, the project illuminated some data and usability issues. A fair amount of the data needed by VAS resides in Army standard systems, but they are not always accessible. Other elements do not exist. Also, although VAS functions, it would require additional work to make it a helpful tool at the everyday working level.

R-4195-OSD/A/AF Civil-Military Relations and National Security Thinking in Czechoslovakia: A Conference Report. T. S. Szayna, J. B. Steinberg. 1992.

This report summarizes the results of a workshop entitled "Civil-Military Relations and the Development of National Security Policy in the United States and Czech and Slovak Federal Republic," held in Prague on May 5–7, 1991. The central conclusion from the workshop is that the Czechoslovak military has evolved greatly toward a genuine state institution since the political changes in late 1989. However, Czechoslovak officials look to the United States (as well as other Western countries) for help in training personnel, both uniformed military and civilian security experts. Such help would ensure the continued successful transformation of the Czechoslovak military. The workshop occurred before the August 1991 coup that marked the end of Communist dictatorship in the former USSR. As a result, the sense of unease about instability and potential spillover of ethnic strife from the Ukraine into Slovakia has probably increased. The disintegration of Yugoslavia and the potential for the spread of the conflict have also emerged as real threats to stability in the region. These developments are bound to motivate Czechoslovak officials to continue to further institutionalize the Conference on Security and Cooperation in Europe (CSCE) and to attain security guarantees through membership in Western security organizations.

R-4200-A The Rise and Fall of National Security Decisionmaking in the Former USSR: Implications for Russia and the Commonwealth. H. Gelman. 1992.

This report examines the Soviet political-military mechanisms used in the Gorbachev era for national security decisionmaking and explains how the struggle over control of those mechanisms contributed to the events that led to the failed August 1991 coup. The report argues that during the months leading up to the August coup, the leaders of the military-industrial complex discovered that the centrifugal process in the USSR steadily whittled away at their traditional ability to use central institutions to carry out unilateral decisions affecting the republics, and that a prominent motive for the coup was the hope of halting that process by preventing the imminent signing of a union treaty that would formalize a vast further reduction in the degree of influence those leaders enjoyed. The critical issue of the ideological leanings of the actors involved in whatever new supreme institutions for national security coordinating and decisionmaking eventually reemerge in Russia was underscored in the spring of 1992 by disturbing signs that Yeltsin was coming under increasing pressure to make concessions to the traditionally dominant forces in the military institution.

R-4201-A The New World Order and Army Doctrine: The Doctrinal Renaissance of Operations Short of War? J. M. Taw, R. C. Leicht. 1992.

This report examines the development of Army doctrine relevant to military operations short of war and noncombat operations and how doctrinal treatment of nonconventional operations affects the Army's capabilities in low intensity conflict (LIC) environments. The report concludes that progress toward a workable, integrated LIC doctrine has been slow, but is occurring. Doctrinal manuals currently in draft should be published without fundamental changes, enabling the Army to move toward a better doctrine for guiding its efforts in this area. It also concludes that the Army cannot continue to maintain its focus on conventional conflict as the primary ingredient of success to the exclusion of nonconventional capabilities. For the U.S. military to play a successful supporting role in peacetime or in conflict-whether through training of international military students, civil affairs, or various forms of civic action-U.S. troops themselves must be adequately versed in the precepts of internal defense and development, LIC and sensitive political environments, civil-military relations, and respect for human rights.

R-4204-AF/A Bridge or Barrier?: Turkey and the West After the Cold War. I. O. Lesser. 1992.

This report explores the roots of Turkey's western orientation and the prospects for Turkish relations with Europe and the United States after the Cold War. The study indicates that Turkey's basic western orientation will almost certainly hold and that the prospects for Turkey formally joining the European Community have not improved despite Turkish support in the Gulf War. Turkey's prospects for inclusion in new European security arrangements will remain poor, and Turkey will become increasingly distinctive and perhaps isolated within the NATO alliance. It also finds that if Europe excludes Turkey, then the significance of the bilateral relationship

with the United States will grow and that U.S. and Turkish interests are likely to remain broadly congruent. Given these findings, the United States should strive to promote Turkey's strategic importance in Europe and the Middle East, avoid pressing Ankara for a formal expansion of defense cooperation, consider the potential role of Turkey as a conduit for western aid to the southern republics of the former Soviet Union, seek the development of a more mature and diversified relationship mixing traditional security assistance with expansion of political and economic ties, and continue playing an active role in promoting a Cyprus settlement.

R-4220-A Two Shades of Green: Environmental Protection and Combat Training. D. S. Rubenson, J. Aroesty, C. Thompsen. 1992.

This report discusses the implications of environmental restrictions on combat training. Of the two types of environmental challenges the Army faces-rule-based legislation, generally associated with EPA-implemented regulation, and planning or procedural law related to conservation, preservation, and land management practice-the latter has greater potential to influence the military mission and is harder for the Army to deal with. This is clear for Fort Bragg, where the Army initially failed to grasp the elements of a suitable response to enforcing the Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service (FSW) over the Red Cockaded Woodpeckers (RCW), a federally listed endangered species. As a result, Fort Bragg was forced to implement a plan that may degrade its military mission over time, something it might have avoided if it had early on offered a plan that protected RCWs while seeking to minimize restrictions on training. Although installations vary, the study argues that the lessons of Fort Bragg can be generalized to form the foundation for a broad proactive Army strategy.

R-4224-A How to Estimate the Costs of Changes in Army Individual Skill Training. S. Way-Smith. 1993.

This report describes a method to estimate costs of changes in Army courses that result from changes in training strategies. The methodology, called TRAM (Training Resource Analysis Method), employs a five-step procedure that begins with a baseline analysis, determines changes, estimates cost, and analyzes trade-offs and risks. Applying the methodology to four variations of the Army's Armor Officer Advanced Course that include different lengths, approaches (e.g., centralized vs. dispersed), and mediums (e.g., paper vs. computer-assisted) reveals potentially substantial savings. But the savings depend directly on the choice of media and how training is implemented in the field. Distributed training saves money only if capacity already exists, development and support costs remain low, and the course uses "low-tech" media. The analysis suggests three significant conclusions. First, savings normally result from trading off other factors such as effectiveness or capability. Detailing changes in activities allows decisionmakers to apply experience and judgment to determine if the savings justify the tradeoffs. Second, a significant part of training costs stems from support and base operations functions that are relatively insensitive to changes in course length and method. Without other major changes such as facilities consolidation, savings in training costs will only occur at the margin. Finally, distributing more training than field units can readily absorb drives training costs up significantly.

R-4228-A Linking Future Training Concepts to Army Individual Training Programs. J. D. Winkler, S. J. Kirin, J. S. Uebersax. 1992.

This report presents the results of research seeking to link new Army training concepts for changing institutional training programs to specific occupations and courses. It analyzes, across a range of occupations, alternative training approaches that may be more affordable and flexible than current techniques for individual skill training. The report examines training-related characteristics of Army occupations and identifies general training-related dimensions that characterize Army entry-level enlisted military occupational specialties (MOS). The authors find the principal training-related dimensions include ability requirements, dominant task characteristics (procedural or verbal), similarity to civilian occupations, and resource intensity. The dimensions can be linked to new training concepts under consideration by the Army (i.e., distributed training; use of training aids, devices, simulators, and simulations; use of civilian training sources). The authors find these results useful in suggesting MOS in which particular training concepts and strategies may prove most feasible and cost-effective.

R-4229-A French Security Policy After the Cold War: Continuity, Change, and Implications for the United States. P. H. Gordon. 1992.

This report examines contemporary French security policies and finds that despite momentous geopolitical changes in Europe since late 1989, the basic elements of French security policy have not changed much, as revealed both in France's relations with Europe and NATO and in France's response to the Gulf War. Looking ahead, the study finds that a major reorientation of security policy is unlikely in the near term. For U.S. policy, the study finds that it is not in America's interest to "marginalize" or "isolate" France by focusing solely on our "Atlantic" allies in Europe. While the study shows evidence that immobilism is more likely than major change in French-U.S. relations, it still argues that the United States should not oppose attempts to create a European security and defense identity and that it should do more to show France that the rejuvenation of NATO is not meant to exclude and replace everything else.

R-4232-AF/A Turkey Faces East: New Orientations Toward the Middle East and the Old Soviet Union. G. E. Fuller. 1992.

This report explores the roots of Turkey's eastern orientation and the prospects for Turkish relations with the

Middle East and former Soviet Union. The study finds that although Turkey has for years been at the geopolitical tail-end of Europe, it is now in the center of a newly emerging world. New relations to the south, east, and north are becoming increasingly vital to Ankara's interests. The study also finds that because U.S. interests in the region are less important with the end of the Cold War, U.S. influence over Turkey will probably be less. Still, the study recommends that because of the constructive role Turkey can play in the region, Turkey should be tied closely to the European Community and that effort should be taken to prevent a wall from emerging between "Christian" Europe and a Muslim Middle East-a wall that could intensify a North-South struggle in the decades ahead.

R-4238-A Linear Programming Methodology for Evaluating Conventional Munitions Mixes (U). R. E. Stanton, M. B. Schaffer, G. Gould, K. P. Horn, G. E. Dolbear, J. Hiland, D. Orletsky, H. Ory, G. I. Taylor. 1993. CONFIDENTIAL LIMITED: US GOV'T AGENCIES & CONTRACTORS

R-4242-A Design of Field-Based Crosstraining Programs and Implications for Readiness. W. G. Wild, B. R. Orvis, R. M. Mazel, I. Maclennan, R. D. Bender. 1993

As part of a broad effort to reduce defense expenditures, the Army is exploring a number of new approaches to training individual soldiers. Prominent among these approaches is "field-based crosstraining (FBCT)," which involves combining two or more occupational specialties and shifting initial skill training from Army schools to on-the-job training in field units. This report describes a method for analyzing the features, advantages, and disadvantages of field-based crosstraining programs in the Army. Focusing on the specific case of helicopter maintenance, the report analyzes data from field units and recommends alternative field-based crosstraining strategies for the Army. An assessment of the Army's Apprentice Mechanic Initiative (AMI) for helicopter maintenance is included in the analysis.

R-4268-AF/A Post-Cold War U.S. Security Strategies for the Persian Gulf. M. Agmon. 1993.

The end of the Cold War has presented the United States with an opportunity to adopt a different strategy toward the Persian Gulf region. In the past, the policy has been one of close and enduring political, military, and personal ties with friendly regimes. An opportunity for a more distant, "insulating" policy now presents itself. This report analyzes the potential costs and benefits of such a strategy. It posits four possible strategies-two traditional and two insulating-and evaluates them against five criteria. All strategies have different degrees of risk and benefit. Analyzing all factors leads to three major conclusions. First, whatever strategy is pursued, the United States needs to maintain sufficient military resources to serve as a balancing force in the region. Second, the two alternatives that emphasize either all-Arab or Saudi defense of the region pose the highest risk in terms of political instability. Finally, regional arms control makes all alternatives less costly and more beneficial.

NOTES

N-1157-A Nomograms for the Calculation of Propagation Effects on Tactical Millimeter-Wave Radio Links. W. Sollfrey. June 1979.

Description of the development and use of nomograms for calculating propagation effects on tactical millimeter-wave radio links. The principal causes of attenuation in the millimeter-wave band (35–75 GHz) are oxygen absorption, which depends on radio frequency, and rain scattering, which depends on frequency and rain rate. The nomograms display these dependencies and the range equation, and may be used to calculate communication system performance as a function of range, frequency, and rain rate by simply drawing straight lines between scales. Use of the nomograms is illustrated by several worked examples. By following the techniques demonstrated in the examples, the user should be able to solve link performance problems speedily and simply.

N-1461-A Performance of Tactical Millimeter-Wave Radio Links—Vol. II: Technical Results (U). J. R. Clark, W. Sollfrey, S. Katz. June 1980. CONFIDENTIAL LIMITED: US GOV'T OR REFER TO CLIENT

(U) A detailed technical assessment of the feasibility of using millimeter waves for short-hop tactical communications. The environmental performance of short-range (less than 10 km) mm-wave transceivers with voice, video, and data capabilities is investigated and modeled. Emphasis is on two frequency bands and the propagation phemomena important in these bands. See also R-2518.

N-1664-A An Analysis of Cognitive Mapping Skill. S. E. Goldin, P. W. Thorndyke. March 1981.

Compares the performance of good and poor cognitive mappers on a variety of spatial knowledge acquisition and judgment tasks. Cognitive mapping skill was assessed by measuring subjects' knowledge of a highly overlearned environment, their home community. Subjects categorized as good or poor cognitive mappers participated in a series of experiments that examined learning a novel environment from navigation experience, map learning, map using and map interpretation, spatial judgments based on a memorized map, and navigation in a novel environment based on a memorized map. Good mappers performed more accurately than poor mappers in learning a novel environment, learning maps, and making spatial judgments based on a memorized map. Map using, map interpretation, and navigation tasks did not distinguish good from poor mappers. The authors conclude that, relative to poor mappers, good cognitive

mappers are better able to encode and retain spatial information in memory and to mentally transform or manipulate spatial information in order to make spatial judgments, and they hypothesize that differences in spatial visualization and visual memory abilities may underlie these variations in task performance.

N-1667-A Ability Differences and Cognitive Mapping Skill. P. W. Thorndyke, S. E. Goldin. March 1981.

Compares good and poor cognitive mappers on a number of individual difference variables potentially related to cognitive mapping skill: spatial abilities, visual/verbal processing style, motivation, and experience. Good and poor mapper groups were given several assessment tests for each of these categories. Comparisons of good and poor mappers' performance on these tests indicated that only spatial abilities reliably distinguished good mappers from poor mappers. Good cognitive mappers showed greater visualization ability, spatial orientation ability, visual memory, and field independence. Other measures showed no between-group differences. It is concluded that spatial ability is a major determinant of cognitive mapping skill and that spatial ability tests can be used to select personnel for tasks requiring navigation, orientation, and spatial judgment skills. (Author)

N-1675-A Simulating Navigation for Spatial Knowledge Acquisition. S. E. Goldin, P. W. Thorndyke. May 1981.

Compares actual and simulated navigation as alternative sources of environmental knowledge. Subjects experienced a 5.15-mile tour through an unfamiliar environment through either a bus ride or a film taken from an automobile driving along the route. In addition, subjects received either a map to be studied prior to navigation, a verbal narrative giving angle and distance information during navigation, or no supplementary information. Film (simulated navigation) groups performed as well as or better than tour groups on landmark and configural knowledge measures. They were inferior to tour groups in route sequence knowledge only on turning angles. Supplementary information affected only film groups. Narration tended to depress performance; map study enhanced configural knowledge but depressed route knowledge. The authors conclude that simulated navigation can substitute for actual navigation under some circumstances, and that map supplements can enhance abstraction of configural relations from simulated navigation.

N-2317-A Conceptual Design for an Army Logistics Assessment—Extended (ALA-X) Methodology. J. H. Bigelow. July 1985.

This Note describes a conceptual design for Army Logistics Assessment—Extended (ALA-X), a methodology for assessing the readiness and sustainability of the U.S. Army. The methodology is intended for use in the Planning, Programming, and Budgeting process, so that those parts of the Army program dealing with logistics functions and resources can be better prepared and justified. The ALA-X methodology will relate resources among 38 categories of logistics resources to specific measures of combat capability and will treat them simultaneously so that tradeoffs and substitutions can be performed.

N-2403-A Combat Identification and Fratricide: SHORAD Preliminary Findings (U). M. Callero, C. T. Veit, B. J. Rose. May 1986. CONFIDENTIAL NO DTIC RELEASABLE TO NATO

(U) This Note documents a briefing on RAND Arroyo Center research into aspects of ground-to-air fratricide—the engagement of friendly aircraft by Army Air Defense systems—in the event of a Central European war. It considers (1) how bad the current combat identification and fratricide situation is, measured in combat effectiveness terms; (2) what the major causes are; (3) what achievable means would improve the situation; and (4) what impact the improvements would have.

N-2410-A Military Space Systems and Space Technology Applications: An Annotated Briefing (U). C. M. Crain, G. Gould, J. Hiland, J. H. Rosen, K. E. Phillips. June 1986. SECRET NO DTIC LIMITED: US GOV'T OR REFER TO CLIENT

The title of this document describes its content.

N-2413-AF/A On the Adapting of Political-Military Games for Various Purposes. W. M. Jones. March 1986.

Political-military gaming has long been used to study international confrontations and conflicts, to provide a means of interchange for groups of scholars and operators interested in the interplay of political and military factors in area confrontations, and to educate and train people who may actually become involved in dealing with such confrontations. The basic structure and procedures of this type of gaming are subject to considerable variation. This Note attempts to describe these structures and processes, and is designed as a primer on the subject.

N-2430-A Soviet Political Perspectives on Power Projection. F. Fukuyama, S. Bruckner, S. W. Stoecker. March 1987.

This Note analyzes the views of Soviet non-military writers and political leaders on the question of power projection in the Third World. Although Soviet writers do not broach the subject directly, they touch on power projection indirectly when writing on the themes of (1) the local political basis of revolutionary power, (2) external (Soviet Union) aid and assistance to Third World clients vs. competing domestic and military claims, (3) the role of "armed struggle" in promoting revolutionary change, and (4) the risky effects of Third World activism on relations with the United States. Each of these themes is examined in some detail. The authors find that only in discussions of armed struggle as a revolutionary strategy do the Soviets recognize greater opportunities for power

projection, and this is restricted to Central America. Possible future Soviet policy is discussed.

N-2438-A Applying the National Training Center Experience: Incidence of Ground-to-Ground Fratricide. M. Goldsmith. February 1986.

This Note uses data from the National Training Center instrumentation and observer systems to measure the frequency of fratricidal ground-to-ground engagements, to make some estimate of their importance to battle outcome, and to gain insights into the cases. Because the available data do not include infantry weapons, this study covers only vehicle system engagements and simulated artillery engagements. The study found that 1 to 3 percent of Blue vehicle kills were fratricidal, most fratricides were isolated, and multiple fratricides occurred mostly at night. For indirect fire, an average of 26.7 artillery missions were fired per battle. Of these, 3.1 percent resulted in fratricide, while 33 percent struck the enemy.

N-2461-A Utilizing the Data from the Army's National Training Center: Analytical Plan. R. A. Levine, J. S. Hodges, M. Goldsmith. June 1986.

This Note describes the Army's operations at its National Training Center (NTC) at Fort Irwin, California, and ways in which the data collected during those operations can be used to derive lessons about Army doctrine, training, and weapon systems. The discussion of operations at the NTC includes descriptions of the training conducted there, the facilities for training and data collection, and the types of data actually or potentially available. As a laboratory for deriving lessons, the NTC has unique advantages and disadvantages. These have implications for using the NTC experience to formulate and test hypotheses. In particular, the authors emphasize the importance of testing the results of formal analytic procedures against the experience and intuition of NTC and other military personnel. (See also N-2384.)

N-2515-A Divergent Warsaw Pact Interests with Respect to East European Trade with the West (U). B. Zycher. December 1987. SECRET NOFORN LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC

(U) This Note examines divergent Soviet and East European preferences with respect to the latter nations' trade relations with the West. The author reviews (1) Warsaw Pact vulnerabilities and economic policy, (2) Soviet economic policy in Eastern Europe, (3) recent trade behavior within the Council for Mutual Economic Assistance (CMEA), (4) non-Soviet Warsaw Pact/Western trade in light of the stated preferences of the Soviets and East Europeans, and (5) economic development and the CMEA science and technology agreement. Finally, he outlines the points that will have to be considered in formulating Western policy options.

N-2594-A Studies in Defense Organization: A Guide to Title III of the Department of Defense Reorganization Act of 1986. J. L. Lacy. April 1987.

Title III of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 directs the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Secretaries of the military departments to conduct separate studies ("reassessments") of the defense agencies and Department of Defense field activities. This Note, prepared at the request of the Army Reorganization Commission, examines the terms and the legislative background of the study requirement. It reviews the factors that animated the Congress to act as it did, and suggests the kind of study most appropriate to respond to the evident Congressional intent.

N-2624-A Families and Mission: A Review of the Effects of Family Factors on Army Attrition, Retention, and Readiness. G. Vernez, G. Zellman. August 1987.

This Note (1) reviews the Army's rationales for provision of quality-of-life and family support services; (2) presents an analytic framework for analyzing the influence of family factors and support programs on Army families and on the Army; and (3) organizes and evaluates findings of previous research about the effects of Army policies and services on both families and specific Army outcomes—attrition, retention, and readiness. In addition, it identifies gaps in knowledge about Army-family interactions, discusses the implications of research findings for Army family policy formulation, and suggests directions for future research.

N-2628-A Applying the National Training Center Experience: Tactical Reconnaissance. M. Goldsmith, J. S. Hodges. October 1987.

Many observers have noted shortcomings in tactical reconnaissance during battles at the National Training Center. This study systematically examines battle data from two sources: take-home packages prepared for unit remedial training, and field data specifically collected for the present study. The author finds a clear correlation between success in offensive missions and reconnaissance. However, data indicate that essential reconnaissance tasks are accomplished in only half the battles studied. Generally, units do not exploit all the assets potentially available for reconnaissance. Task forces do not seem to give emphasis to the reconnaissance task. Review of doctrinal literature and courses of instruction indicate that added emphasis needs to be placed on reconnaissance in the Army training system. The author makes specific recommendations for changes in doctrine and for additional instruction. He also suggests several equipment changes and additions, as well as courses of action for task force commanders and staffs.

N-2630-A Developing and Assessing Concepts for Future U.S. Army Warfighting: A Progress Report. P. J. Romero. April 1988.

The U.S. Army's concept-based requirements system stipulates that future materiel requirements should be based on a concept of warfighting that has undergone extensive analysis and refinement. This Note reports on the progress of an ongoing RAND effort to develop a method to help systematize and streamline the process of designing concepts. RAND's model will provide a first-order estimate of the forces and resources needed to meet specified theater success goals for alternative concept designs. The model is meant to be flexible and fast-running, in order to serve as a tool for the exploration of new concept ideas. Analysts using the model will be able to experiment with variations in operational policy, examine the payoffs of improved technical performance, and conduct sensitivity analysis to identify robust concepts.

N-2716-A/DR&E Counterforce Responses to Tactical Ballistic Missiles (U). A. Slomovic, K. P. Horn. November 1991. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS NO DTIC INTEL

N-2718-A Reducing Risks Associated with Developing the LHX Mission Equipment Package. M. B. Berman, D. W. McIver, B. R. Orvis, M. L. Robbins, H. L. Shulman, R. H. Ruth. January 1989.

This Note describes RAND research into logistics supportability of the Mission Equipment Package (MEP) for the Army's proposed Light Helicopter Experimental (LHX). The LHX MEP specifications set a very advanced technological goal that poses several challenges to reliability, availability, and maintainability (RAM). The authors suggest a strategy by which the Army can ensure they meet these RAM challenges and attain the associated benefits in MEP performance and cost savings.

N-2719-A Automatic and Aided Target Recognition for LHX. H. H. Bailey, H. Ory, M. B. Schaffer. January 1989.

Automatic or aided target recognition (ATR) involves an imaging sensor (preferably more than one) plus a rather large amount of data processing. Such systems, by shortening the exposure times of aircraft during targeting, can be very helpful and may be essential to the survivability of the LHX (Light Helicopter Experimental). These systems are just now evolving to a useful level of capability. It is anticipated that these levels will approach 0.9 detection probability, 0.8 recognition probability, and 0.02 false alarms per square degree under favorable conditions. Tests to date have been promising, but they have involved only a limited variety of backgrounds and environments and have not included adequate representation of countermeasures. These conditions must be included in the continuing evolution and tests of ATR, but it appears probable that useful goals will be accomplished in time for the LHX program.

N-2720-A Reactive Threats to LHX (U). J. Hiland, C. M. Crain, L. G. Mundie. April 1990. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

(U) This Note describes a component of RAND's LHX (Light Helicopter Experimental) research that considers potential Soviet responses to LHX deployment—responses that might attempt to exploit LHX design and operational vulnerabilities. Based on an earlier assessment of the reactive threat to LHX, the Note summarizes an illustrative LHX operational deployment and the menu of survivability techniques currently planned for implementation. It discusses several potential reactive threat concepts and relates them to the survivability techniques. The authors conclude that the subject of reactive threats and U.S. countermeasures warrants serious and continuing attention. They recommend that the LHX program adopt a responsive threat strategy that considers a broad spectrum of reactive threats from the design stage and identifies design options for countermeasures that can be implemented if and when a specific Soviet response becomes evident.

N-2721-A LHX Mission Equipment Package Tradeoffs. M. B. Schaffer, H. Ory. April 1990.

This Note addresses technologies and issues associated with the mission equipment package (MEP) of the LHX (Light Helicopter Experimental). The study considers communications, navigation, target acquisition, and air survivability equipment, as well as cockpit displays in terms of their importance to the LHX missions, and their prospects of meeting performance requirements. The Note also compares weight allocations with those for similar equipment in Apache. Based on an extensive information base that includes the Army's cost and operational effectiveness analyses reports, briefings and reports generated during the LHX study, and first-order analyses performed to clarify particular issues, the authors conclude that the LHX Program Management Office generic selection of MEP systems, and the functions they represent, are well matched to the extensive set of missions for which LHX is intended. With the exception of the doppler velocity sensor, each system is necessary for some aspect of mission accomplishment, so that deletion of any to save weight and cost would result in loss of mission capability.

N-2724-A Armament for LHX (U). M. B. Schaffer, W. R. Benson. August 1989. SECRET NOFORN WNINTEL LIMITED: US GOV'T OR REFER TO CLIENT NO DTIC INTEL

(U) This Note discusses LHX (Light Helicopter Experimental) armament issues in terms of initial operational capability (around the year 1996) and from a second-generation perspective (around the years 2000–2020). It analyzes munitions capabilities relative to the evolving threat, identifies the shortcomings of the current weapons suite, and outlines the characteristics of more desirable and effective systems. The authors

recommendations include replacements for the first-generation systems and a set of broad specifications for the SCAT, or Scout Attack, gun.

N-2725-A LHX Communications Issues (U). E. M. Cesar, H. Ory, M. B. Schaffer. April 1990. SECRET NO DTIC LIMITED: US GOV'T AGENCIES & CONTRACTORS OR REFER TO CLIENT

(U) This Note addresses issues related to the communication equipment and operating modes currently planned for the LHX (Light Helicopter Experimental), and their effects on the capability and performance of the LHX in accomplishing the approved missions, especially those in support of combined arms operations. The authors conclude that the communications suite planned for LHX satisfies the extensive mission requirements. However, a few minor deficiencies remain, and further improvements in simplification of operation, efficiency, and performance in difficult situations is desirable.

N-2727-1-AF/A/DARPA/DR&E RJARS: RAND's Version of the Jamming Aircraft and Radar Simulation. W. Sollfrey. 1991.

This Note describes an updated version of RJARS (RAND's version of the Jamming Aircraft and Radar Simulation). The present RJARS is a many-on-many computer simulation in the C language involving aircraft, radars, jamming systems, offensive and defensive missiles, infrared and optical systems, and a command-control-communications system for the defense. It can operate in conjunction with the RAND programs JANUS and CAGIS. RJARS treats sortie operations and evaluates jamming effectiveness and mission attrition at a level of detail that includes reasonable refinements of equipment operation without excessive calculational complexity. This Note describes RJARS and its sequence of operations, shows how to prepare input files and operate RJARS, gives programming details, and provides a glossary of the approximately 1,100 variables used in RJARS.

N-2737-A Clients and Commitments: Soviet-Vietnamese Relations, 1978-1988. S. W. Stoecker. December 1989.

This Note examines the evolution of the Soviet-Vietnamese relationship over the past decade in three contexts: (1) Soviet behavior in supporting the Vietnamese troops during the invasion of Cambodia in late 1978 and in defending them during the Chinese incursion of Vietnam in early 1979, (2) the level of Soviet economic and military aid, and (3) the impact of General Secretary Gorbachev's "new thinking" on Soviet-Vietnamese relations. The record shows a Soviet disinclination to take risks in this region of the world, chiefly because of the proximity to China, even in the late 1970s during the height of Brezhnev's interventionism. Under Gorbachev, not only does interventionism appear remote, but tangible results in reducing tensions in Southeast Asia already have been achieved. Specifically, by September of 1989, thousands of Vietnamese troops left Cambodia, thus fulfilling the third "precondition" set by China on the path to improved Sino-Soviet relations.

N-2742-A Near-Term Options for Active Defense Against Tactical Missiles (U). J. Bonomo, J. G. Bolten, D. Dreyfuss, T. B. Garber. December 1989. SECRET

N-2760-A LHX Mission Analysis Using MOSF SUN Terrain Procedures: An Overview of System Logic. A. L. Zobrist, L. J. Marcelino. May 1989.

The mission analysis element of the RAND LHX (Light Helicopter Experimental) study is concerned with comparative analysis of helicopter/tilt rotor configurations in a mission context. Complex mission contexts are simulated with the standard JANUS system. This Note describes a RAND-developed system that supports and enhances the JANUS results by applying higher data resolution and greater engineering detail to selected parts of the JANUS cases.

N-2765-A Relating Selected Army Logistics Resources to Combat Performance Measures. J. H. Bigelow. August 1988.

This Note describes ALA-X (Army Logistics Assessment—Extended), a project to develop a prototype methodology to build the logistics portion of the Army five-year program. In particular, it describes the central model, the logistics decision model (LDM), among the many small models that are used in the ALA-X methodology. LDM is a highly aggregate, two-sided, deterministic simulation of a theater campaign. Once LDM is calibrated, a user can vary stocks of resources and capacities, and observe their effects on combat performance measures. An additional set of models, the logistics functional models, make it possible to bridge the gap between the physical resources of the Army program and the capacities measured by ALA-X. (Presented at the 56th Military Operations Research Society Symposium, held at the Naval Postgraduate School in Monterey, California, June 28–30, 1988.)

N-2776-AFMIC Potential Use of Agents of Biological Origin by Terrorists (U). K. A. Solomon, M. L. Juncosa, C. G. McWright, J. Simon, M. S. Colen, K. Gardela. July 1989. CONFIDENTIAL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT

(U) This Note identifies and discusses potential technological and political threats to U.S. citizens and military, both within and outside the continental United States, from terrorist use of biological weapons. It also evaluates whether the potential threat warrants specific countermeasures. The authors present, in tabular form, synoptic profiles of the characteristics, spheres of activity, personalities, and weapons employed by 26 terrorist groups. They also outline a matrix of possible attacks with different weapons on different targets, and they conjecture about relative likelihoods of occurrence. The authors

conclude that the extent and intensity of a biological weapon attack can be substantially reduced if appropriate measures are taken, including the establishment of a Federal Biological Emergency Response Team and development of medical readiness.

N-2863-AF/A NATO Conventional Defense: Force Augmentation with European Reservists. R. F. Phillips. January 1989.

NATO could enhance a capability for successful forward defense in several ways. One, the reserve option, would create additional NATO forces from the pool of unused or underused European reservists. To assess the feasibility of the reserve option, this study examines one technical and two policy issues: (1) the factors important to reserve unit effectiveness, (2) the number and type of reserve units required to provide NATO with a capability for successful forward defense, and (3) the manpower and budgetary costs of acquiring that security. The analysis shows that approximately 12 division equivalents of reserve forces, costing $50 billion over 15 years (representing a 1.7 percent increase in the defense expenditures of those nations contributing to NATO's Central European defense), could mount the necessary defense. The least expensive alternative, at a cost of $41.2 billion, would purchase one U.S.-based heavy division with a companion POMCUS set (prepositioned materiel configured in unit sets) in Europe. The addition of a single division, however, would not enable NATO to mount a successful forward defense.

N-2869-A Space Elements of Theater Missile Defense (U). K. P. Horn, G. Gould. September 1990. SECRET NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

(U) This Note investigates the utility of using space assets to provide warning of enemy missile launch to aid tactical missile defense. Three potential Army applications for this warning were evaluated: (1) passive defense measures, such as seeking shelter, donning protective clothing against chemical weapon attack, dispersing mobile vehicles, and flushing aircraft and helicopters; (2) counterfire attacks against enemy missile launchers and launch support facilities; and (3) cueing terminal defense against incoming missiles. The Note compared the utility of space assets vs. non-space alternatives using ground-based systems and found that although using space-based assets was promising, certain technical aspects need to be resolved before such a system could be deployed. As a result, the Note recommended conducting a space demonstration experiment to resolve such technical problems as data processing, connectivity, and decision aids requirements.

N-2890-A Assessment of Communications Operator Proficiency: Design Issues. J. D. Winkler, J. C. Fernandez, J. M. Polich. August 1989.

The U.S. Army Signal Corps provides the means for establishing essential communications between units on the battlefield. Within the various Signal Military Occupational Specialties (MOSs), a key role is played by MOS 31M, which is responsible for operating the tactical communications equipment used in units. This Note describes a design for research to assess the ability of such Signal Corps communications operators to perform their principal duties: (1) installing and operating communications equipment needed for a division or corps to communicate, (2) isolating "bugs" and identifying corrective steps in troubleshooting communications systems, and (3) installing antennas effectively and safely. The study uses the Reactive Electronic Equipment Simulator (REES), a high-fidelity computer-controlled simulation facility consisting of four signal nodes and 28 training positions. The REES tabulates all of the actions taken by each operator on each piece of equipment and records these data for later analysis of individual and team performance.

N-2891-A Assessment of PATRIOT Air Defense System Operator Proficiency: Design Issues. B. R. Orvis, M. T. Childress, J. M. Polich. August 1989.

The PATRIOT (Phased Array Tracking to Intercept of Target) missile system, the most modern and automated of the Army's Air Defense Artillery systems, protects U.S. and NATO assets from the high- to medium-altitude enemy air threat. This Note describes a research design to assess the performance of PATRIOT enlisted operators and to link that performance to the outcomes of simulated air battles. The research will examine the efficiency and effectiveness of the tactical control assistant and the tactical director assistant in (1) protecting valuable assets, engaging enemy aircraft, and assisting in the protection of friendly aircraft as is required for success during air battles; and (2) directing fire units to engage specific aircraft in order to protect assets and destroy enemy aircraft.

N-2916-A U.S. and Soviet Relations with Argentina: Obstacles and Opportunities for the U.S. Army. R. Schmidt. November 1989.

Over the last two decades, Argentina has become the Soviet Union's largest trading partner in Latin America, a fact that some analysts fear signifies growing Soviet leverage in the so-called Southern Cone region of South America. This analysis suggests that Soviet-Argentine economic relations are likely to remain strong, but that the Soviet Union's strategic interests in Argentina are limited. Meanwhile, the United States is cultivating its own influence in Argentina, although it must operate in an environment with strong anti-U.S. sentiment. The U.S. Army can best enhance U.S. influence in the region by strengthening its military education and exchange programs with the Argentine Army. These exchange programs provide the opportunity to transfer the U.S. Army's professional skills. As compared with other U.S. Army policy options, education and exchange programs are also of low visibility—an important factor, since many

Argentine people perceive a threat to their democracy from their own armed forces.

N-2917-A Patterns in American Intellectual Frontiers. C. H. Builder. August 1990.

This Note examines the notion that a pattern exists in the ideas that have captured and dominated American society. Specifically, over the past 200 years, four such ideas have risen and been widely perceived as the most exciting way to shape the American future, persisting for about 50 years and then giving way to the next idea. Based on that pattern, five earlier ideas can be recognized, going back to the sixteenth century. Having defined a pattern of nine ideas extending over nearly half a millenium, the author suggests three more ideas that might fulfill the pattern for the next hundred years. Looking backward and then forward based on ideas rather than events provides a different kind of projection into the future. Specifically, the events of the past take on a different shading in the context of the ebb and flow of ideas; moreover, the trends may now appear to be in decline or ascendancy. Although understanding the intellectual patterns of the past may not tell us the answer to what is next, it does provide a clearer sense of the domains where new developments should be expected.

N-2975-A/OSD Potential Vulnerabilities of NATO Assets to Conventional Tactical Ballistic Missile Attacks and the Effectiveness of Passive Responses (U). J. C. Wendt, P. A. Wilson, S. S. Glennan. 1991. SECRET FORMERLY RESTRICTED DATA NOFORN WNINTEL LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC INTEL

(U) This Note, based on research completed in April 1988, documents an analysis of the potential vulnerabilities of some NATO assets to attacks by Soviet tactical ballistic missiles (TBMs) and the effectiveness of passive responses to those attacks. It describes the components of a Soviet "deep operations" system that include both reconnaissance, surveillance, tracking, and acquisition systems as well as the TBMs. Based on an analysis of various missile attacks against a number of representative NATO assets without passive measures and those same missile attacks against the same assets with passive measures, the authors suggest measures to reduce the potential vulnerability of some NATO assets.

N-2984-A Applying the National Training Center Experience: Artillery Targeting Accuracy. M. Goldsmith, J. S. Hodges, M. L. Burn. April 1990.

This Note describes a study that examined the accuracy of simulated artillery fires during force-on-force engagements at the National Training Center (NTC). The authors found that only about one-third of artillery missions were either effective or suppressive. Available data show that artillery observers using only map, compass, and binoculars cannot consistently achieve accurate first-round fire-for-effect. NTC data show that initial fire plans are likewise insufficiently accurate. The authors make recommen-dations for doctrinal and procedural improvements and for added training equipment.

N-2985-A/OSD The Impact of Missile Proliferation on U.S. Power Projection Capabilities. D. S. Rubenson, A. Slomovic. June 1990.

The growth in the numbers and capabilities of ballistic missiles outside Central Europe implies that non-nuclear ballistic missile threats, especially in combination with the growing capacity to produce chemical weapons, may pose an increasing threat to fixed U.S. overseas facilities and U.S. forces on rapid deployment missions. This Note addresses the proliferation of ballistic missiles with conventional warheads, including chemical warheads. Examining current ballistic missile arsenals reveals that they consist largely of inaccurate, short-range missiles, located mostly in North Africa and the Middle East. However, a geographically diverse set of countries are developing new missiles with improved ranges and capabilities, and this Note discusses the damage that can be inflicted by ballistic missiles armed with conventional munitions. Finally, the Note considers the chemical threat, demonstrating a correlation between countries that own ballistic missiles and countries seeking to develop a chemical weapons capability. The analysis shows that using even today's ballistic missile systems with chemical weapons could represent a major military threat for which the United States is relatively unprepared. Furthermore, the approaches for counteracting the chemical threat that are effective in Central Europe must be reevaluated and adjusted for the environment faced by U.S. forces in other areas of the world.

N-2994-A Corps and Division Command Staff Turnover in the 1980s. J. P. Kahan. October 1989.

This Note presents the results of a survey of all active component U.S. Army corps and division headquarters requesting the names and times of service of their commanders, deputy commanders, chiefs of staff, and assistant chiefs of staff during the 1980s. It examines command staff turnover with respect to two contrasting models of team composition. The first model, a "unit team" one, assumes that a team is constructed from scratch and stays together over a period of time. The second model, a "steady state" one, assumes that the staff is a continuous social entity that people enter and leave at regular intervals. Analysis of turbulence data showed that the steady-state model is far more descriptive of current corps and division staffs than the unit composition model. The findings suggest that (1) team-building training should emphasize the rapid socialization of new staff members as a constant task for a unit, and (2) exercises should be designed to test and reinforce the mutual understanding among staff members as well as the performance of standard operating procedures. The Army may wish to consider whether it should implement a division and corps command staff assignment procedure that would result in more stable, cohesive teams.

N-3045-A Verifying Conventional Stability in Europe: An Overview. T. J. Hirschfeld. April 1990.

Verifying the obligations in the prospective Conventional Forces in Europe (CFE) treaty will be far harder and more expensive than verifying those in the Intermediate-Range Nuclear Forces (INF) treaty, or in other previous arms control agreements. This Note presents a qualitative overview of conventional arms control verification issues, including (1) monitoring force levels calibrated in major items of equipment and personnel, in a large production area that makes concealment possible; (2) watching force withdrawals, restructuring, or disbandments involving removal, reexport, or destruction of thousands of heavy equipment items; (3) monitoring the post-agreement stasis of the largest and most complex force concentration in peacetime history; and (4) meshing these observations with the concurrent need to monitor unilateral Warsaw Pact force reductions and force changes on a massive scale.

N-3061-A Preliminary Assessments for Employing Selected Army Pacing IEW Systems in Central Europe (U). E. M. Cesar, J. R. Bondanella, D. Gonzales, C. Shipbaugh, R. Howe. August 1990. SECRET NOFORN LIMITED: US GOV'T & CONTRACTORS OR REFER TO CLIENT NO DTIC

(U) Army decisionmakers require in-depth analysis on which to base requirements for new intelligence and electronic warfare (IEW) systems. Essential to the justification process is having a credible way to reach consensus about the potential contributions these systems can make to combat outcomes. This study attempts to aid decisionmakers in their task of reaching consensus on the types of systems and appropriate mixes and quantities of IEW systems to select. The authors find that the Pacing system-of-systems inherently depends on having appropriate sets of manned airborne and ground-based standoff systems to cue unmanned aerial penetrators that can fly close to target areas and obtain high-resolution details for target identification, tracking, and acquisition for corps and division weapons. Each system can make important but different contributions to the family of systems and can provide different responsiveness, accuracy, and survivability factors. The optimum mix for all operational systems has yet to be determined, but the most important factors and a methodology for finding them have been identified.

N-3077-A A Multiprocessor Execution Profiler. C. D. Burdorf, J. P. Fitch, J. Marti, J. A. Padget. December 1989.

Existing profiling tools generally have crude interfaces, are clumsy to use, and monitor only accumulated CPU (central processing unit) time and function calls. After examining these programs, the authors concluded that they are insufficient aids for profiling a large-scale multiprocessing system even if they are adequate for manual analysis of a single processor system. The authors developed a tool that collects the following information: where CPU time is expended, quality and quantity of data passed between functions, how much global data is referenced and modified, and how these characteristics differ among processors on the network. To simplify data inspection, the profiler has a mouse-driven graphical interface. The authors used the system on a number of single- and multiprocessor Lisp programs. The profiler proved its usefulness in performance improvement and problem identification. This Note, reprinted from *Proceedings of the Twenty-Second Annual Hawaii International Conference on System Science* Kailua-Kona, Hawaii, January 3–6, 1989, describes the design of the profiler and gives examples of its utilization.

N-3087-DR&E/A/AF Suggested Modifications to Optical Sensor Algorithms in JANUS. H. H. Bailey, L. G. Mundie, H. Ory. November 1990.

Optical sensor algorithms in the JANUS(T) ground combat simulation do not include a repeated detection criterion for target acquisition and weapon firing, nor do they provide for the effects of false detections. As a result, targets detected with very low probability, such as those at ranges near the performance limit of the sensor, will often give rise to acquisition and weapon-firing decisions when rare single detections result from coverage by many sensors and time cycles. This Note reviews the detection algorithms for optical sensors implemented in JANUS(T), identifies some approximations that can lead to overoptimistic estimates of target acquisition probabilities when the calculated detection probability is small, and suggests an acquisition criterion that alleviates the problem.

N-3093-A Exploratory Modeling and the Use of Simulation for Policy Analysis. S. C. Bankes. 1992.

This Note describes how "exploratory modeling" provides a rationale for how computer models can be fruitfully employed in support of policy studies. The goal of exploratory modeling is to construct a compelling argument illuminating the choices among policy options. Three innovations in the methodology of model construction can help exploit exploratory modeling's potential: (1) model design driven by the question being asked rather than by details of the system being studied; (2) use of multiple models rather than a single "monolithic" model; and (3) model development by a process of "selective resolution." The Note also suggests improvements to computer technology that taken together would provide support for interactive and adaptive modeling; assistance in managing the complexity of numerous models, cases, and relationships between them; and a means for portraying the results of exploratory modeling. Exploratory modeling can motivate better use of computers in support of policy analysis, provide for a better allocation of resources in dealing with the real problems, and afford some protection against fooling ourselves.

N-3099-A Non-Preemptive Time Warp Scheduling Algorithms. C. D. Burdorf, J. Marti. June 1990.

The Time Warp multiprocessing scheme promises speed-up for object-oriented discrete-event simulation. The Concurrent Processing for Advanced Simulation project has constructed a LISP-based Time Warp system for implementing simulations with many large, complex objects. Since object events are not preempted, the authors are scheduling which objects have events process rather than CPU time per object. They developed approaches to scheduling, ranging from a simple round-robin mechanism to complex ones involving queue length. The authors developed ten different scheduling algorithms which they named Worst Case, Conventional Round Robin, Lowest Local Virtual Time (LVT) First, Priority LVT, Largest Queue Priority, Bradford/Fitch, Anti-Penalty, Queue Anti-Penalty, Queue Cycle, and Positive Infinity. Results show that LVT, anti-messages, rollbacks, returned messages, and anti-reminders are good parameters for scheduling of system resources. Input queue size is also an important factor, but when taken with or without LVT, it does not produce results as good as using LVT alone. The round-robin scheduler was one of the worst performers. The poor performance of the simple round-robin scheduler indicates the advantages of using state information to determine the scheduling order in the Time Warp system. Benchmarks of the schedulers showed that the Anti-Penalty scheduler performed better than the others. The Anti-Penalty algorithm is based on a composite measure of simulation advance rate, flow control, and the appearance of specific message types. The benchmark simulation executed on a five-processor Time Warp system.

N-3101-A Methodological Considerations in Using Simulation to Assess the Combat Value of Intelligence and Electronic Warfare. S. C. Bankes. 1991.

The relative value of systems for intelligence and electronic warfare/target acquisition (IEW/TA) may be determined in a variety of ways, including the comparison of technical characteristics, ability to provide estimations of commanders' information needs, or subjective judgment by experts. The OPVIEW (operational value of intelligence and electronic warfare) project aims to develop means for evaluating IEW/TA systems in terms of their contribution to combat outcomes. Such an evaluation would permit comparisons between diverse systems and force components and evaluation of the combined value of groups of systems. Simulation could be a powerful analytic tool for determining the contribution to combat outcomes of IEW/TA systems, since it allows us to represent our understanding of the complex effects and relationships that characterize warfare and to observe the implications of our beliefs for different cases under varied assumptions. Unfortunately, existing combat simulations do not adequately represent intelligence and electronic warfare. There are fundamental technical reasons for this, and there are technical challenges that must be addressed to support the analysis of the combat value of IEW/TA with simulation models. This Note describes these challenges and considers ways to meet them.

N-3103-A Apogee, Perigee, and Recovery: Chronology of Army Exploitation of Space. E. Mitchell. 1991.

Since the mid-1980s, a debate has gone on within the Department of Defense (DOD) on whether it is appropriate for the Army to be increasingly involved in space and, if so, how the Army should exploit space. This Note (1) describes the evolution of the Army's exploitation of space in response to an emerging post-World War II Soviet threat while complying with national policy and organizational directives; (2) informs the current Army, DOD, students, and others of the full spectrum of the Army's past and current exploitation of space; and (3) provides a chronology of policy decisions and events, from 1907 through mid-1989, which have shaped the Army's exploitation in the technological areas of ballistic missiles, satellites, early-warning radars, ground stations, anti-satellite defenses, anti-ballistic missile defenses, theater missile defenses, and tactical missiles.

N-3137-A TOW Missile System Utilization at the National Training Center. M. Goldsmith. October 1990.

This Note reports on one phase of an ongoing project, the goal of which is to apply the experience and information gained at the National Training Center (NTC) at Fort Irwin, California, to problems beyond the NTC's mission of training. The problem examined here is the use of the tube-launched, optically tracked, wire-guided (TOW) missile system in Echo company of the mechanized infantry battalion task forces at the NTC. The study team examined the relative effectiveness of the TOW missile and tank main guns and compared the result with the experience of the opposing force (OPFOR) antitank guided-missile (ATGM) unit. Differences are clear, and the team analyzed both OPFOR and U.S. Army tactics for the use of ATGM and the characteristics of the equipment to explain the differences. To exploit the TOW weapon systems in the attack, AirLand Battle doctrine requires speed and agility of the carrier that matches that of the other maneuver elements. As the improved TOW vehicle (ITV) carrier cannot meet this requirement, the author suggests that the U.S. Army consider replacing its ITV carriers with M3 Bradley vehicles to provide greater speed and maneuverability to the antitank company. At the same time, doctrine must be rewritten so these characteristics can be exploited and aligned with AirLand Battle.

N-3143-A Restructuring and the Polarization of Soviet Politics. J. R. Azrael. June 1990.

This Note examines the economic and political changes that have taken place in the Soviet Union since Mikhail Gorbachev's accession to power, and assesses the longer-term implications of those changes. Following an evaluation of Gorbachev's "first-term" performance as a crisis manager, the Note examines the current situation and concludes with speculation on future prospects. The study concludes that (1) Gorbachev has presided over, and contributed to, a deepening systemic crisis; (2) militant

opposition to Gorbachev has been building on both the right and left; (3) while Gorbachev may be able to use his new presidential powers to keep things under control, the Soviet Union may be on the verge of a civil war; and (4) the existence of a clear and present danger of a violent implosion in the Soviet Union has significant implications for U.S. policy.

N-3151-A Observations of the Caravan Guard 89 Exercise. P. D. Allen, T. Lippiatt, L. Pleger, T. Polsley. 1992.

N-3152-A Observations on the Centurion Shield 90 Exercise. P. D. Allen, J. P. Kahan, T. F. Lippiatt, T. Polsley, D. R. Worley. 1992.

Given the end of the Cold War, the necessity of continued military exercises in Central Europe has been questioned. Large-scale field exercises are economically and politically costly, causing, among other things, damage to civilian crops and property as units maneuver over private and public property during training. This Note presents recommendations on issues emerging from observations of Centurion Shield 90, a field training exercise conducted January 15–26, 1990, combining live and simulated units in a single exercise. The authors focus is on the simulation interfaces, including simulations linked with each other and with units on the ground. The most important issues involve exercise design, exercise manning, scenario-related issues, threat representation, and simulation calibration. Preliminary results indicate that using simulations probably improves the quality of training in several functional areas, but this improvement is difficult to measure. There are reduced operational and maneuver damage costs, but increased costs of simulation support.

N-3180-A U.S. Grand Strategy for the 1990s and Beyond. T. J. Hirschfeld. November 1990.

The profound global changes foreshadowed by the events of 1989 suggest the need for new strategies and different forces for the United States. This Note shows how the changed global environment could permit the evolution of different kinds of U.S. forces to support four alternative future U.S. strategies suitable for different situations: (1) retain the full range of mission capabilities as the last remaining global power, (2) rely mainly on collective security by preparing to engage in combat operations only in cooperation with others, (3) confine U.S. military cooperation with others primarily to logistic and technical support, and (4) maintain a mobilization base against the worst contingencies. The author concludes that all postulated strategies assume the U.S. need for a healthy mobilization base, some requirement for rescue missions, and a permanent capability to inflict punishment at a distance. Strategic nuclear weapons remain necessary under all strategies, as does the need to continue honoring those alliance commitments that remain. Finally, these strategies imply different investment priorities.

N-3187-A The 2 + 2 + 4 Recruiting Experiment: Design and Initial Results. R. J. Buddin, J. M. Polich. October 1990.

This Note describes the design and first six months of experience for a national experiment on a proposed new recruiting program for the U.S. Army. The program, called the "2 + 2 + 4" recruiting option, is one of the tools the Army believes could help sustain its ability to attract high-quality young people during difficult recruiting periods in the future. The authors present RAND's design for the test as a controlled experiment, similar to earlier enlistment incentive tests, and present preliminary tabulations of results during the first six months of the test. The test established a framework for systematic assessment of the 2 + 2 + 4 program and set up a precise mechanism for possible future tests of other enlistment options through individually randomized assignment in the REQUEST system. The test showed that a substantial number of recruits are willing to commit for two years in the Selected Reserve to obtain an Army College Fund benefit. It also showed that offering the 2 + 2 + 4 option has led relatively few recruits to choose a short term of service in place of a longer term or to move from a combat to a noncombat skill. It is too soon to determine whether the program led to a significant increase in the total number of high-quality recruits entering the Army.

N-3261-A When the Weak Attack the Strong: Failures of Deterrence. B. Wolf. 1991.

One potential justification for a thin area missile defense is the increasing proliferation of ballistic missiles and weapons of mass destruction. However, it has been argued that states possessing such weapons would not attack much stronger states such as the United States and the Soviet Union. This Note examines historical instances of attacks by states against much stronger counterparts. A taxonomy of such deterrence failures is formulated and illustrated with examples. Conclusions are drawn about the applicability of various types of deterrence failure to potential attacks by states possessing weapons of mass destruction against stronger states.

N-3263-A/RC Sizing Relationships for Ballistic Missile Defense Constellations of Kinetic Energy Weapons. S. M. S. Everingham. 1991.

This Note examines the effects of satellite constellation sizing, orbit inclination, orbit altitude, and kill vehicle velocity-added capability on the boost and post-boost phase ballistic missile defense capability of a space-based interceptor system. In particular, it compares the geometric coverage and missile negation potentials of a large number of interceptor deployment options, options that range from concentrated deployments of many interceptors on relatively few satellite platforms to a dispersed deployment of many platforms, each carrying a single interceptor, which characterizes the "brilliant pebbles" concept.

N-3275-A/AF The Military's Entry into Air Interdiction of Drug Trafficking from South America. J. L. Ahart, G. J. Stiles. 1991.

This Note examines the military's participation in the air interdiction of international drug traffic. On the larger question of the effectiveness of drug interdiction efforts, the research indicates that interdiction efforts are having an impact on the drug market by diverting drug smugglers from the easier routes. The research also indicates that although the interfaces between the agencies involved in the civilian interdiction forces are highly complicated and not clearly defined, the effort is well established, experienced, and (apparently) working. Finally, the research indicates that the military's contributions to the air interdiction of drug traffic are significant, are providing positive benefits to the overall effort, and are growing in importance. Nonetheless, inserting the military forces into the established domain of civilian law enforcement agencies has produced problems, such as the inherent tension between the military philosophy of action and the civilian need for building evidence and the precise observance of procedures; civilian/military equipment mismatches; turf wars; and realization that increasing civilian/military integration could undercut the effort if the military has to pull out to deal with a national defense need.

N-3277-A Differences over Economics in the Soviet Leadership, 1988-1990. A. Aslund. 1991.

This Note discusses the most important differences among key Soviet leaders between the summer of 1988 and December 1990 on four central issues: agricultural policy, the Soviet financial crisis, pricing policy, and economic reform. In addition to examining Gorbachev's views, the Note also considers the views of the main actors dealing with economic concerns—Central Committee Secretary Yegor Ligachev, Prime Minister Nikolai Ryzhkov, Gosplan Chairman Yurii Maslyukov, Central Committee Secretary Nikolai Slyunkov, and Deputy Prime Minister Leonid Abalkin. The study of the views of these main actors on the four economic issues revealed that the Soviet leaders were so divided on the issues that they were virtually splintered. The communist leadership as a whole had fallen behind the development of public opinion, thus rendering itself increasingly irrelevant to Soviet society. The outstanding feature of the period 1988–1990 seems to be that it was the time when Soviet communist leaders failed to act and therefore lost the power to affect economic trends.

N-3300-A Extracting Tactical Data from Operation Orders. J. R. Kipps, J. Marti. 1992.

This Note describes an approach to automating the extraction of operation orders (OPORDs) and describes an application of the approach to the task of generating the OPORD translation system, which extracts task organization data from input OPORDs. This approach is one of the tools being developed to assist Division Ammunition Officers (DAOs) in anticipating ammunition consumption before battle, a capability that is a vital component of logistics operations in the Army's emerging AirLand Operations doctrine. Described here is a machine-translation approach that takes advantage of the prescribed five-paragraph format of OPORDs to identify and isolate pertinent information. This approach uses concise and clear rules to automatically generate programs that take as input textual OPORDs such as those transmitted through the Maneuver Control System (MCS), extract the desired data, and send them to other computer systems. The techniques described here are generally applicable to extracting and checking data from a wide range of highly structured but not "machine-readable" documents.

N-3313-A Organizational Analysis and Resource Management Planning: Annotated Briefing. L. K. Lewis, C. R. Roll, R. E. Sortor, B. Rostker. 1993.

This Note analyzes ways in which the Army might alter its organizational structure and program-building processes to better respond to OSD guidelines and the Army's resource needs. The Note discusses three alternative concepts of operation: Centralized Control (CC), whereby a neutral integrator (NI) owns all the relevant data and models; Structured Response (SR), which would allow staff proponents to function as intermediaries between the NI and the Major Commands (MACOMs); and Structured Dialogue (SD), in which the NI retains responsibility for all aggregate data bases and models, but the staff proponents and MACOMs own the data bases and develop options that are then presented to the NI. In terms of three selection criteria—effectiveness, efficiency, and implementation—the authors conclude that the SR option was the most beneficial to the Army. The Note recommends immediately establishing the Office of the NI, transferring functions to the new NI organization (e.g., integration, management of key program-building data bases), reorganizing the data base structure to support Planning, Programming, and Budgeting, and Execution System (PPBES), and developing planning and programming models.

N-3324-A/AF U.S. Army Advanced Munitions: High Payoff Targets-Illustrative Cases (U). G. I. Taylor, D. Orletsky, R. E. Stanton. February 1993. SECRET NOFORN WNINTEL NO DTIC LIMITED: DOD INTEL

(U) This Note contains the targeting information needed to analyze advanced munitions requirements and to develop an investment strategy for future procurement. The Note describes a base case focused on a conventional war between NATO and the Soviet Union in the post-CFE environment. It provides a basis for determining the high end of advanced munitions requirements for future investment strategies. It also describes a second case that portrays Iraqi forces in an offensive role invading Saudi Arabia in late September 1990. They are opposed by the initial elements of U.S. forces in concert with Saudi and possibly other coalition forces. The case provides insights for future contingency operations involving U.S. and allied forces. The Note also contains the types of targets for

each case across three different zones, as well as estimates of the number of targets in these zones that can be attacked. Future iterations of this targeting information may describe the reduced levels of threat for low-intensity conflict and guerrilla operations in Third-World environments.

N-3348-AF/A Historical Roots of Contemporary Debates on Soviet Military Doctrine and Defense. S. W. Stoecker. 1991.

This Note examines the themes of, and historical context for, the writings of Soviet strategists of the 1920s, such as Alexander Svechin and Leon Trotsky, who emphasized the importance of defensive operations. It discusses early Soviet debates about the "operational-political" and "operational-strategic" aspects of doctrine, wars of destruction vs. wars of attrition, and strategic offense vs. strategic defense, as well as related arguments about the organization and missions of infantry and the use of fortifications. Finally, it suggests some parallels between the strategic circumstances facing Soviet military theorists in the 1920s and those confronting planners today.

N-3354-A Performance-Oriented Logistics Assessment (POLA): Relating Logistics Functional Capacities to Resources and Costs. J. H. Bigelow, T. J. Martin, R. L. Petruschell. 1992.

This Note describes models and procedures other than the Logistics Decision Model (LDM) that are part of POLA methodology—models and procedures used to estimate Combat Service Support (CSS) unit capacities from their equipment inventories, to estimate the costs of increasing those capacities by adding or replacing equipment, and to construct cases for analysis. To estimate the costs of logistics improvements to CSS units, a simple cost model is used that estimates nonrecurring and annual recurring costs of acquiring, maintaining, and operating an active Army unit (or collection of units) in peacetime. The model is then applied to a unit before it receives a logistics improvement and afterwards, with the cost of the improvement being the difference between "before" and "after" cost estimates. Defining cases for analysis requires first identifying CSS units to be considered, then describing each unit identified, both as it appears initially and as it may appear once it receives a logistics improvement, and finally combining unit descriptions into overall analysis cases. (See also R-3814, R-3823, N-3393.)

N-3358-A Mortar Utilization at the Army's Combat Training Centers. S. J. Kirin, M. Goldsmith. 1992.

Data from take-home packages and field observations suggested that light, medium, and heavy mortar weapons were underutilized or ineffective at three Combat Training Centers (CTCs)—the National Training Center (NTC), Joint Readiness Training Center (JRTC), and Combat Maneuver Training Center (CMTC). Observer/controller data confirmed that mortars caused little damage and mortar ammunition expenditure fell far below that expected and provided for in ammunition stockage. Mortars are underutilized at the CTCs because of perceived limited effects of suppression and, for heavy mortar training, limited dismounted infantry activity observed at NTC and CMTC. In addition to revising field manuals to provide better doctrinal guidance on use of mortars, CTC and home station training need to emphasize the task force commander's responsibility to identify specific mortar missions, the task force fire support officer's responsibility to design the linkage that allows mortars to execute the missions, and the importance of conducting fire support rehearsals with mortar platoon participation. Mortars should be more closely integrated with the lower level maneuver organizations, not with field artillery organizations. Whether to add forward observers to mortar platoons merits further investigation.

N-3386-A U.S. Army Communications Using Commercial Satellites. D. Castleman, S. M. S. Everingham, J. J. Milanese, E. D. Harris, E. Bedrosian. 1992.

This Note documents research evaluating the use of commercial communications satellites (COMSATS) to augment the U.S. military satellite communications (MILSATCOM) system. The study finds that COMSATS can offer attractive advantages, including available capacity, global coverage, interoperability, flexibility, and no user-borne development risk. Several commercial systems now provide (or will soon provide) wideband and multiuser services, with the International Telecommunications Satellite Organization (INTELSAT) and the International Maritime Satellite Organization (INMARSAT) both offering global coverage and available capacity. A combination of such systems could provide uninterrupted communications between the Commander in Chief in the continental United States and others in a global power projection operation, particularly during the early deployment phase. Such a capability would complement other Army systems used for local tactical communications. In terms of regulatory constraints on using such systems for military purposes, recent interpretations of the charters defining their use reveal that any resistance on the part of INTELSAT or INMARSAT in serving the military customer has faded.

N-3393-A Performance-Oriented Logistics Assessment (POLA): Preparing the Logistics Decision Model for Use in Analyses. J. H. Bigelow, T. J. Martin, R. L. Petruschell. 1992.

This Note explains how to prepare the Logistics Decision Model (LDM) for use in subsequent analyses. The study discusses two main parts of this task: calibrating the representation of combat and preparing a representation of the theater support system. Calibration involves adjusting various LDM inputs so the model behaves "correctly" in a specified reference (or calibration) case. To date, LDM is calibrated to the Concept Evaluation Model (CEM) and to its replacement, the Force Evaluation Model (FORCEM). The calibration process draws from CEM and FORCEM data files such inputs as time-phased schedules for Blue and Red force and resources to enter the theater,

comparing LDM simulation results with CEM and FORCEM outputs and then judiciously adjusting LDM inputs until they match CEM and FORCEM outputs. In building the theater support structure, LDM relies on an activity matrix—representing a resource that can be produced, consumed, or otherwise transformed by one or more activities—and a resource matrix—calculating the quantity of each resource available during each time period of an LDM simulation. (See also R-3814, R-3823, N-3354.)

N-3403-DARPA/AF/A New Issues and Tools for Future Military Analysis: A Workshop Summary. R. J. Hillestad, R. Huber, M. G. Weiner. 1992.

This Note reports on a workshop held at RAND in May 1991 to discuss the new concerns analysts must face following the changes that have taken place in Central and Eastern Europe and Southwest Asia since 1989. The workshop produced a number of specific recommendations to the military analysis community and its sponsors: 1) continue to discuss issues of military analysis in open forums; 2) develop a quick reaction analysis approach with supporting tools; 3) reinstitute basic principles of systems analysis (attention to uncertainty, multiple scenario analysis, parametric analysis, comparative analysis, etc.), which may have atrophied because of the relatively stable planning scenario of the Cold War era; 4) promote basic research on complex phenomena, such as qualitative factors (training, morale, leadership), behavior of C3I systems, and new types of conflict; 5) promote multiorganization analysis of complex issues as well as multiple analyses of the same issues; and 6) promote education of analysts in the synthesis and solution of defense problems and education of decisionmakers in the use and limitations of analysis.

N-3405-A Soldiers' Families: Tracking Their Well-Being During Peacetime and War. J. Hawes-Dawson, P. A. Morrison. 1992.

This Note presents a proposal for how to query a representative sample of Army families and obtain timely information on topics that change quickly. Accommodating the Army's growing need for timely information (as exemplified by Operations Desert Shield and Storm) requires a flexible survey plan that can be tailored to a broad spectrum of unforeseeable circumstances in peacetime and wartime contingencies. The study's proposed plan relies on an ongoing panel of families who are recontacted periodically by telephone (to confirm location) and are available for repeated computer-assisted telephone interviewing. The sample is designed so data gathered can be generalized to all Army families and achieves timeliness by narrowing at will the elapsed time from when the policymaker poses a question to the point when the survey delivers a generalizable answer. The plan's feasibility is enhanced because lines of communication are maintained (thus enabling "minisurveys"), workload can be varied to meet needs according to urgency, and postwar surveys can be mounted swiftly given the existing and continuously recontacted sample.

N-3436-A/USN Management Adaptations in Jet Engine Repair at a Naval Aviation Depot in Support of Operation Desert Shield/Storm. L. A. Galway. 1992.

This Note investigates management adaptations taken to speed up the repair of jet engines during Operation Desert Shield/Storm. Most data were gathered from the engine repair shop at the Naval Aviation Depot in San Diego, CA. Management adaptations fell into two general categories: item oriented and process oriented. The former dealt with specific items in the engine repair process, e.g., compressor blades, and the latter addressed the engine repair process. We discovered that material support was a major problem, to include sole suppliers of critical items, failure to stock common commercially available items, poor parts visibility, and slow distribution. The absence of a bill of materials for each engine type inhibited planning. Failure to return inoperative engines and an inability to know what was in the retrograde system point to likely problems for future operations. Finally, both horizontal and vertical communications were particularly helpful in dealing with surge-related problems.

N-3441-A The Declining Threat to U.S. Interests. T. J. Hirschfeld. 1993.

This Note identifies generic global and regional U.S. interests, suggests what threats to those interests remain, and postulates additional future risks the United States might face that might have military implications. The author argues that the world is fundamentally different from the world of the 1890s or the 1920s. For example, while the conquest of nature was still one of the agreed purposes of civilization, now its preservation is an agreed global purpose. He further argues that while military technology was only lethal then, now it threatens to annihilate species. These changes suggest that the most identifiable threats to U.S. interests are not amenable to military solutions (e.g., refugee and migration flows, drug problems, social unrest, unfriendly transnational political movements, ecological disasters, proliferation of weapons of mass destruction, and medical emergencies) and that instability may be a pervasive and unpleasant prospect, but not necessarily one which need involve American armed forces much.

N-3446-A Five Models for European Security: Implications for the United States. N. C. Gantz, J. B. Steinberg. 1992.

This Note assesses five alternative security models that could emerge in the next 5–10 years in terms of how well they meet the U.S. objective of transnational stability in Europe. The Note finds that of the five models proposed, the overlapping security institutions model does best, because it preserves a political and military role for the United States, creates alternative links for U.S. involvement in Europe beyond NATO, demonstrates U.S. willingness to adapt to a stronger European role in security

arrangements, and maintains flexibility to move to a number of different security models. The Note recommends that the United States develop a credible rationale for maintaining an integrated military command like NATO, encourage the expansion of the Western European Union's role as a bridge between NATO and the European Community, support the process of European economic and political integration, and encourage the use of the Conference on Security and Cooperation in Europe as a pan-European forum for addressing the security concerns of the newly emerging democracies in the East.

N-3473-A/USN Materiel Problems at a Naval Aviation Depot: A Case Study of the TF-30 Engine. L. A. Galway. 1992.

This Note investigates shortages of repair parts. It uses the TF-30 jet engine as a case study and analyzes the parts shortage using three different measures: delivery time, demand supply profiles, and effect on engine repair. After analyzing data from the Naval Industrial Material Management System (NIMMS) and from three inventory control points, the study draws three major conclusions. First, engine days of delay provides a good indication of which parts cause the most trouble. Second, although a few parts cause the most problems (56 out of 2000), the remainder of the problems result from a heterogeneous set of parts. Finally, most of the supply problem seems to be in getting parts from the DoD supply system to the depot. Recommendations address the need to reduce delays in moving parts to the depot from the DoD system, improve procurement at the inventory control point, rectify problems with databases, and integrate information at the wholesale level.

N-3480-A North Korea in the 1990s: Implications for the Future of the U.S.-South Korea Security Alliance. K. Oh. 1992.

This Note assesses the implications of change for North Korea, the U.S.-South Korea security alliance, and the stability of Northeast Asia. The Note finds that in dealing with its economic plight, political weakness, and diplomatic isolation, the North Korean regime faces a dilemma: remain in power (at least in the short term) by deflecting or suppressing domestic and international challenges, or engage in reform that could threaten the Kims' hold on power. Although the regime has leaned toward the former, there are signs North Korea is looking abroad for help, which argues for the United States continuing to engage North Korea in dialogue on issues of interest to both governments. The U.S.-South Korea relationship will change in the years ahead, with the United States needing to see and treat South Korea as a more equal partner and needing to continue to reduce its military forces in the South both to reflect a diminishing North Korean threat and to respect South Korean nationalistic sentiments.

N-3497-A Planning for the Future U.S. Army in Europe. R. D. Howe, E. Kleckley. 1992.

This Note describes an approach to structuring the United States Army Europe (USAREUR) in the middle to late 1990s as a function of the mission of that command. The study finds that as long as the Army retains forces in Europe, it will serve as the ground arm of the United States European Command (USEUCOM), as the visible symbol of U.S. involvement in, and commitment to, European security and stability, and as the counter to the potential power of the former Soviet Union (or unified successor). Meeting these functions will require a future USAREUR that is visible, capable, flexible, and expandable. Specifically, USAREUR must have a more balanced and flexible force structure than in the past, with likely missions requiring that a larger fraction of USAREUR have enhanced strategic (theater) mobility. Most important, USAREUR requires a clear and complete mission to determine the force levels it will need.

N-3508-AF/A/OSD Getting U.S. Military Power to the Desert: An Annotated Briefing. D. Kassing. 1992.

This Note describes the main dimensions of U.S. deployments to the Gulf area and reviews the performance of the deployment systems. The Note highlights six deployment and execution issues: (1) for the first month of the Phase I deployments, total transportation requirements were hard to pin down, with much of the uncertainty traceable to varying estimates of Army noncombat unit requirements; (2) initial air deployments were hampered by problems of coordination between users and the Military Airlift Command; (3) during Phase II, unit integrity was not preserved in sealift operations; (4) during Phase II, the coordination of passenger and equipment deliveries was abandoned to get personnel into the area before the January 15th deadline; (5) resupply cargos in air channels came to exceed capacity; and (6) many prewar planning factors proved optimistic. To prepare for future contingencies that may require faster deployments through seaports and airports that are under attack, the Department of Defense needs to consider such issues as how to provide more responsive planning and how to improve the coordination of deployment operations.

N-3511-A Predicting the Battlefield Performance of Anti-Armor Missiles: A Case Study of the TOW Missile System (U). J. Grossman. August 1992. CONFIDENTIAL LIMITED: US GOV'T AGENCIES OR REFER TO CLIENT

This Note reports on some initial results from a study investigating the utility of using the data from live-fire exercises of precision-guided munitions (PGMs) conducted by the Air Force, Army, and Marines. The study uses the tube-launched, optically tracked, wire-guided (TOW) missile system as a case study. The study finds that by analyzing live-fire data in terms of how well it replicates combat conditions, analysts can fairly accurately predict the effectiveness of PGMs for given battlefield conditions.

N-3517-A Upgrading an Office Automation Environment: The Army's DCSPER Automation Project Final Report. H. J. Shukiar, R. Gates, R. J. Kaplan. 1992.

In November 1990, the Office of the Deputy Chief of Staff for Personnel (ODCSPER), U.S. Army, asked RAND to evaluate its current computing environment and recommend a course of action to improve it. RAND developed a questionnaire for ODCSPER staff members that focused on five broad categories: user characteristics; user sophistication; desktop- and nearby-equipment usage; user communications; and problems, limitations, and desired capabilities. This Note summarizes the survey results and suggests several evolutionary enhancements to ODCSPER's computing environment. The enhancements are designed to address concerns identified in the survey and provide ODCSPER with a flexible computing architecture that permits ready adaptation to changing technologies. As part of the incremental approach to improving ODCSPER office automation, the authors recommend three conceptual steps that, taken together, would foster a well integrated cooperative processing environment: (1) integrate the ODCSPER computing environment via a local-area network, providing direct peer-to-peer connectivity among computer users; (2) add centralized file managers/servers to the network, within which to store important documents in preparation, other important products, and databases down-loaded from the mainframes; and (3) add centralized computer servers to the network, coupled with migration of the electronic mail function from the mainframe to the servers.

N-3527-A The Army Military Occupational Specialty Database. S. J. Kirin, J. D. Winkler. 1992.

This Note describes a dataset that integrates training-related information from a variety of military and civilian sources, at the military occupational specialty (MOS) level of detail. The database describes all Army MOS authorized as of fiscal year 1990, including personnel management statistics, enlistment prerequisites and incentives, tasks, training requirements and costs, and "crosswalks" to civilian occupations and educational programs. It documents the database and illustrates the data to describe Army occupational structure and training. It also discusses potential uses of the data for supporting analyses of training and personnel structure alternatives.

N-3535-A Recommended Strategy for the Army's Role in Space. E. D. Harris, K. P. Horn, E. M. Cesar, P. S. Steinberg. 1993.

This Note lays out a recommended strategy for the Army's role in space, drawing on research the Arroyo Center has performed in this area over the past seven years. The document argues that the Army should make supporting the battlefield commander its primary role in space, supplementing the argument with a discussion of how the Army used space to support the battlefield commander during Operations Desert Shield and Storm. It then argues that implementing this role requires modifying the Army's organization so that it emphasizes space, which involves institutionalizing space in the Army's warfighting doctrine, establishing a high-ranking authority, and correcting the requirements and acquisition process. The document then proposes that the Army pursue a two-part investment strategy that involves exploiting existing space systems and participating in satellite requirement studies. Finally, it argues that the Army needs to modify its operational procedures for space to deal with such issues as training and information distribution.

N-3551-A Finding a New Approach to Measure the Operational Value of Intelligence for Military Operations: Annotated Briefing. E. M. Cesar, P. D. Allen, R. Eden. 1992.

This Note documents the final executive-level briefing for a project whose goal was to develop and apply innovative analytic tools for quantifying the operational value of intelligence, electronic warfare/target acquisition (IEW/TA). The Note discusses the three analytic tools produced by the project: a methodology for relating commanders' requirements to collection results and two models that employ the methodology. The "static" model provides an aggregate assessment of the capability of specified systems and system packages to meet commanders' information needs in specified scenarios. The "dynamic" model is more detailed and broader in scope, assessing the impact of intelligence collection on commanders' decisionmaking over the course of an operation from initial planning to its conclusion. All three tools depend fundamentally on subjective-judgment data, but these data are systematically developed using experts in operations planning, intelligence collection and production, and analysis. The Note concludes with a discussion of the status of the three tools developed during the project and potential future directions for their use.

N-3558-AF/A Turkey: Toward the Twenty-First Century. P. B. Henze. 1992.

This Note discusses the most important trends in Turkey's political, economic, and social development, focusing on the last decade's progress and on future prospects. The study finds that Turkey will build on its record of stability and economic accomplishment during the 1980s to maintain an effective political and social system and to make further economic progress during the 1990s. Turkey will balance orientations toward Europe, the Middle East, and new republics of the Soviet Union (which are mostly Muslim and Turkic) during the 1990s while continuing to look toward the United States as its principal security partner within NATO. Prospects for continued economic progress are good, though persistent inflation, growing budget deficits, and the need for privatization of state economic enterprises require serious action. Finally, while Turkey will likely be very politically and socially cohesive and the standing of the military will remain high, military influence on government will wane.

N-3564-A U.S. Conventional Arms Control for Korea: A Proposed Approach. J. C. Wendt. 1993.

This Note presents an approach for integrating arms control into the changing Korean security environment and for evaluating how alternative arms control measures affect U.S. interests. The study identifies five U.S. arms control objectives: maintain U.S. presence, minimize short-warning threat, eliminate ground force disparity, maintain a U.S. reinforcement capability, and produce a verifiable agreement. The study then finds that equipment reductions, which involve equal ceilings on three critical pieces of equipment, and U.S. reductions (above a residual amount) proportional to North Korean reductions, would meet four of the five objectives. (Exercise limitations and notifications would help meet the fifth one.) While the approach apparently satisfies South Korean objectives, it may not be enough for the North Koreans. Thus, if the United States and South Korea place a sufficiently high value on achieving their objectives, other political/economic incentives may have to be offered.

N-3566-AF/A Air Combat Model Engagement and Attrition Processes High Level Design. P. D. Allen. 1993.

This Note presents the high-level design document for air combat (engagement and attrition processes) for the theater-level or nonlinear combat (TLC/NLC) model and possibly, for the RAND Strategy Assessment System (RSAS). The design includes many qualitative factors not traditionally included in previous air combat models, such as a representation of how intelligence affects the frequency and distribution of specific types of air-to-air, ground-to-air, and air-to-ground engagements. The design is intended to be implemented as either a stochastic or a deterministic model, with either low resolution or high resolution, depending on the needs of the user. Thus, the model is being designed so that each version will be readily comparable given similar inputs. The document describes the three main parts of the overall air combat assessment process: 1)determine whether or not penetrators are detected before reaching in engagement zones; 2) determine the sequence of ground-to-air, and air-to-air, and air-to-ground engagements; and 3) assess air-to-air, ground-to-air, and air to ground engagements in sequence determined for ingress and egress.

N-3568-A Tactical Satellite Orbital Simulation and Requirements Study. E. Bedrosian, E. M. Cesar, J. R. Clark, G. K. Huth, K. Poehlmann, P. Propper. 1993.

This Note documents the results of a preliminary analysis of space communications requirements employing scenarios for military operations in three widely separated geographical areas where U.S. contingency operations could occur. The first scenario is set in Southwest Asia and is similar to Desert Shield/Storm, except with jamming; the second is set in Korea to typify a large operation between in-place forces, again with jamming; and the third is set in Argentina to typify a small operation in a remote location. Based on Desert Shield/Storm experience and on RAND's experience with military communications satellite systems, the study argues that jamming will present a serious threat and that jam-resistant communication satellites and portable tactical jam-resistant earth terminals must continue to be fielded and developed. To test the operational scenarios under realistic circumstances, a comprehensive computer simulation will need to be developed-one that involves developing a system configuration tool capable of configuring a satellite communication system using the specified equipment and communications requirements within the spatial and temporal relationships laid out in the scenarios.

N-3568/1-A Tactical Satellite Orbital Simulation and Requirements Study: Analysis of Satellite Communications Data (U). E. Bedrosian, E. M. Cesar, J. R. Clark, G. K. Huth, K. M. Poehlmann, P. Propper. May 1994. SECRET

(U) This Note documents the results of a preliminary analysis of space communications requirements employing scenarios for military operations in three widely separated geographical areas where U.S. contingency operations could occur. The first scenario is set in Southwest Asia and is similar to Desert Shield/Storm, except with jamming; the second is set in Korea to typify a large operation between in-place forces, again with jamming; and the third is set in Argentina to typify a small operation in a remote location. Based on Desert Shield/Storm experience and on RAND's experience with military communications satellite systems, the study argues that jamming will present a serious threat and that jam-resistant communication satellites and portable tactical jam-resistant earth terminals must continue to be fielded and developed. To test the operational scenarios under realistic circumstances, a comprehensive computer simulation will need to be developed-one that involves developing a system configuration tool capable of configuring a satellite communication system using the specified equipment and communications requirements within the spatial and temporal relationships laid out in the scenarios.

N-3579-AF/A Azerbaijan, Central Asia, and Future Persian Gulf Security. T. W. Karasik. 1993.

This Note examines the economic, religious, and ethnic connections between Transcaucasian and Central Asian Countries (CACs) and Turkey, Iran, Saudi Arabia, and Russia. The study finds that there is a growing interdependency between Azerbaijan and the CACs and Turkey, Iran, and Saudi Arabia; that Russia is becoming increasingly estranged from Azerbaijan and the CACs in terms of economic relations and the perception of a religious threat to Russian security; that Turkish, Saudi, and Iranian involvement is weakening Azeri and CAC central authority; and that Iran is the focal point in the region. The study recommends that the United States encourage stability and the kinds of relationships (e.g., emerging international economic organizations) that will limit outbreaks of violence; that it not ignore other emerging states of the former Soviet Union in its focus on Russia; and that it recognize the risks of isolating Iran or

siding with Turkey or Saudi Arabia against Iran in the battle over influence.

N-3589-AF/A/OSD U.S. Space-Based Remote Sensing: Challenges and Prospects. D. J. Johnson, M. Nelson, R. J. Lempert. 1993.

This Note presents a survey of remote sensing policy issues for the 1990s. The study concludes that as the utility of remote sensing data is more widely understood and appreciated, greater efforts to exploit that data in unique ways will increase, thus blurring the distinctions among users in the federal agencies, state and local governments, and private entities. It will then be up to the owners and operators of remote sensing systems to justify why their particular systems should remain unique. The study recommends that the U.S. government develop remote sensing policies from a more comprehensive perspective, derived from U.S. remote sensing goals, user needs, and the diverse organizations that can participate in meeting those needs; should determine where broadening needs or new technologies allow planned programs to be better coordinated or consolidated to avoid duplication of effort; should determine what areas are best pursued as public endeavors and as commercial or private ones; and should make remote sensing systems more responsive to user needs.

N-3600-A Design of Field-Based Crosstraining Programs and Implications for Readiness: Survey Instrument and Database Documentation. R. M. Mazel. 1992.

This Note documents the survey instruments and data sources used to support the analyses described in RAND report R-4242-A, Design of Field-Based Crosstraining Programs and Implications for Readiness. This study used two forms of data: (1) data collected via specially designed survey instruments; and (2) existing maintenance data and personnel records. Supervisors were queried about their job responsibilities, perceptions of train-up requirements, and perceptions of which military occupational specialties (MOS) might be combined in future training. This study also incorporated data from several existing databases: the Enlisted Master File (EMF), the official Department of the Army information base for enlisted personnel; the Army's Aviation Unscheduled Maintenance Sample Data Collection (UMSDC) system, and the Standard Army Maintenance System's (SAMS) Work Order Logistics File (WOLF). All these databases were used to understand the overall workload and job responsibilities of chosen maintenance units.

N-3603-NA/A/AF Technology and Innovations in Future Warfare: Wargaming the Persian Gulf Case. B. W. Bennett, M. Cecchine, D. B. Fox, S. B. Gardiner. 1993.

This Note describes three "Future of Warfare" games focusing on how a coalition of Iraqi and Iranian forces might employ their military forces to defeat the U.S. and its allies. These games employed a backward planning approach in which the players began with the political objectives and worked backward to determine the resulting military objectives, goals, and specific actions and conditions that would be required for success. In the first game, the players assumed the role of senior Iraqi and Iranian military planners working in 1992 to prepare for a war in 1997 or later with the goal of increasing oil revenues by controlling the Saudi peninsula. In the second and third games, the players assumed the role of senior military planners for the U.S. facing the Iraqi/Iranian coalition, which had, in ten days around the turn of the century, secured a large portion of the Arabian peninsula and fielded a number of new weapon systems. The players were asked to identify their military objectives and design a campaign to accomplish them.

N-3613-A HELICOST: A Helicopter Cost Model. D. Dreyfuss, J. Jarvaise. 1993.

This Note provides a user's guide to the HELICOST model, illustrates its use by applying it to the LH (now Comanche) helicopter program, and presents the technical details underpinning the model's development. The model operates by taking data from the four components of a helicopter-airframe, the mission equipment package by subsystem, the engine, and the software-and computing a cost for them as a function of their weight for the first two, the shaft horsepower for the engine, and the number of lines of computer code for the last. The model provides costs for Research, Development, Test, and Evaluation (RDT&E), production, and total system. It is particularly useful for comparing contractor proposals or determining the effect of trade-offs between cost and performance; it also provides rapid recalculation of costs and ready graphical displays of information. In applying HELICOST to the Comanche helicopter, we found that HELICOST data compared quite favorably with the Army's estimate, coming within 4 percent of total cost.

DRAFTS (RESTRICTED)

DRR-111-2-A A System View of Munitions Storage and Movement for Force Projection. K. J. Girardini, D. Hafele, D. M. Oaks. May 1993.

This draft addresses issues related to storing and distributing munitions in a force projection environment, taking a system view that looks across all the processes required to deliver munitions to the soldier in the field. Four tentative findings have emerged. First, investment and policy decisions for munitions distribution must be driven by joint, time-phased requirements across multiple scenarios. Second, positioning of munitions stocks in the continental United States (CONUS) is becoming increasingly critical as storage facilities approach capacity and facilities are inactivated as part of Base Realignments and Closures. Third, the Department of Defense (DoD)

should maximize integration of containerized munitions distribution with commercial industry (e.g., by using the commercial liner trade for munitions sealift); such integration will allow DoD to concentrate investments in areas requiring a unique military capability (such as intratheater distribution and CONUS storage facilities). Finally, the Army needs to reassess the role of airlift in munitions distribution; given the Army's increasing reliance on high-technology, high-lethality munitions, airlift can provide critical sustainment and firepower for early-deploying units.

DRR-155-A Army's Role in Space in the New Geostrategic Environment: An Annotated Briefing. E. D. Harris, K. P. Horn, D. Castleman, E. M. Cesar, P. S. Steinberg. January 1993.

This draft lays out a recommended strategy for the Army's role in space that argues that space capabilities are essential for Future Army Operations, that space should be a primary-not secondary-means of providing functional support for the battlefield commander, and that commercial systems, especially communications satellites, have supplied and can continue supplying a great deal of the needed capabilities. The draft further argues that to carry out such a strategy, the Army needs to integrate space support into Future Army Operations as an essential element, to establish and support a high-ranking Army authority for space, and to adopt a "move out now" action plan that involves implementing changes in the requirements and acquisition process, relying on commercial systems, concentrating on acquiring ground-based elements for space systems (such as the Global Positioning System), revising training programs, and incorporating space into the Louisiana Maneuvers.

DRR-157-A Summary Review of GPALS and NMD Operational Requirements Documents: An Annotated Briefing (U). E. D. Harris. January 1993. SECRET NOFORN WNINTEL LIMITED INTEL

(U) This draft presents the results of a special assistance effort to quickly review the GPALS and NMD ORDs before they were presented for approval by the JCS. The review presents a side-by-side comparison of the two ORDs. Our findings identified the design threat for GPALS to be excessive given all the changes in the geopolitical environment since the end of the Cold War (i.e., START agreement, Congressional guidance, changes in the U.S./CIS relationship, and projected CIS SSBN deployments). As specified, the GPALS threat would drive the NMD system design to use much larger deployments and probably to the development and deployment of a space-based sensor system. In addition, discrepancies were identified in the GPALS and NMD leakage rates; these needed to be resolved before JCS approval. Finally, because the Army is responsible for five of the major GPALS elements, it needs to understand and consider the implications for NMD of political, budgetary, and arms control uncertainties and the possible impact that these uncertainties might have on the Army as an institution.

DRR-173-A Sealift in Major Regional Contingencies (U). J. A. Isaacson. February 1993. CONFIDENTIAL

This draft analyzes strategic sealift of U.S. Army forces in two parts. The first part of the study analyzes the capacity of the U.S. Army forces to deliver combat and support equipment in a Major Regional Contingency (MRC). This part of the study uses three options reflecting three possible levels of expenditure: (1) no expansion of current assets; (2) programmed expansion of current assets; and (3) sizable expansion of current assets, in addition to procuring several large, medium-speed roll-on/roll-off ships (LMSRs). The second part of the study analyzes the non-concurrent, time-phased sealift of combat units and related cargo to Southwest Asia and Korea. Combat elements include the 24th Infantry Division, the 1st Cavalry Division, the 101st Air Assault Division, the 3rd Armored Cavalry Regiment, and the 82nd Airborne Division. The arrival times of all forces were used as inputs to theater combat modeling efforts in support of the larger post-Cold War Army study.

DRR-210-AF/A Russian Policy Towards Eastern Europe: Problems, Prospects and Policy Implications. F. S. Larrabee. March 1993.

This draft examines how political forces in the new Russia will define what Russia sees as "legitimate" interests in Eastern Europe. The draft argues that three major schools of thought have emerged on Russian foreign policy-a "Euro-Atlantic" school, which favors close ties to the West and more readily accepts the loss of Soviet empire; a "Eur-Asianist" school, which rejects a pro-Western course and favors an "independent" foreign policy; and a "Neo-imperialist" school, which wants to reconstruct the old Soviet Union, but under a Russian nationalist banner-and that foreign policy is shifting more toward the Eur-Asianist school. Russia currently seems to accept that it cannot reincorporate Eastern Europe into an explicit Russian sphere of influence, but would like to delay or slow down Eastern Europe's integration into Western security institutions until it has reasserted influence over the "near abroad" (the territory of the former USSR). The draft concludes that the hardening of Russia's policy toward the near abroad will make the East Europeans nervous and increase their desire for closer ties to the West, especially to NATO.

DRR-220-A Measuring the Value of Scout/ Reconnaissance: A Briefing. C. T. Veit, M. Callero. March 1993.

This draft discusses an approach developed to measure the value of scout/reconnaissance so that different scout/reconnaissance systems (existing and proposed) and different subsystem technological concepts (e.g., sensors) can be compared, with the intent of bringing to light characteristics of the scout/reconnaissance mission that provide high-payoff potential. Because the scout/reconnaissance mission includes elements of technology, military doctrine and concepts, and human processes, an approach was developed that first applies

modern subjective measurement techniques to model the division intelligence staff's performance of situation assessment and its contribution to the division's operational performance. Then, to provide inputs to these human process models, the approach also incorporates the simulation of scout/reconnaissance system missions in high-resolution models. To show the potential of the approach, it was applied in a preliminary manner to assess the value of the RAH-66 Comanche by simulating scout/reconnaissance operations. The indications are that an advanced scout helicopter of this type significantly improves the ground commander's capability to defeat the enemy.

DRR-228-A The Rising Tide: Demographic Pressures and Political Instability in the Middle East. M. E. Morris. March 1993.

This draft examines the implications of projected demographic changes on the stability of the Middle East and the potential role of U.S. policy in the region. The draft argues that high population growth rates, scarce or diminishing resources, increasing urbanization, and population movement and refugee flows, complicated by unresolved and deep-seated political divisions, portend a bleak future for the Middle East. The unsettled Arab-Israeli dilemma has precluded the resolution of other conflict situations and the subsequent development of cooperative regional efforts to address such problems. Without such common efforts, and the major policy changes that must accompany them, the Middle East governments will likely find themselves submerged in a rising tide of demographic problems, complicated by unresolved and deep-seated political divisions. These problems, with their implicit threat of violent upheavals, can affect the nature of future Middle East conflicts and have implications for Army roles, missions, and operations.

DRR-230-A U.S. Force Employment in the Post-Cold War World: Potential Adversary Responses. J. C. Wendt. May 1993.

This draft examines the potential costs and benefits of using military force as an instrument of U.S. policy and describes how the actions of an adversary could change this cost-benefit relationship. The draft argues that weighing the benefits and costs of using military force today is problematic because the current indirect threat makes the benefits less clear; in addition, although the costs have declined because potential adversaries will not likely possess the size or sophistication of the Soviet threat, the costs could go up if the adversaries take a variety of actions: (1) attacking an important U.S. target set (e.g., attacks on ports and airfields or limited but valuable assets like C-141s and C-5s during deployments); (2) acquiring new weapons systems for such attacks (e.g., nuclear weapons and advanced air defense weapons); and (3) using a different strategy or operations for such attacks (e.g., taking hostages). The draft concludes that given this cost-benefit relationship, the use or threatened use of American forces may decline in the future.

DRR-246-A Comparison of the Organizations and Procedures for Materiel Modernization Among the Military Services. E. M. Cesar, G. Frost, L. Horgan, K. P. Horn, B. Schweitzer. August 1993.

This draft addresses the Army's organization and procedures for materiel modernization as seen from a cross-service perspective. The draft argues that the entire requirements generation process is complex, having evolved into an intricate system with both formal and informal mechanisms interlinked with the Planning, Programming and Budgeting System (PPBS). It also argues that the CINCs are becoming much more important in the process, although this change does not appear to be as well recognized in the Army as in the other services, and that all services would benefit if the JCS would provide a more concrete vision of the integrated battlefield. The draft further argues that the Navy and Air Force may have an advantage in the way they promote their requirements and that TRADOC, in its role as combat developer, may be hampered by the narrowness that results from the competing stovepipes of the various branches. The draft concludes with some recommendations for the Army based off these observations.

DRR-256-A Military Formations of the Former USSR Member-States: A Survey. S. Zamascikov. March 1993.

This draft examines the origins, the current environment, and the prospects for the armed forces of the former Soviet Union (FSU) republics. The draft argues that although the dissolution of the Soviet military machine is in the West's interests, it poses some threats to the West. Specifically, the CIS is becoming a very loose security alliance, and most of the FSU republics are building up their own defense establishments. The U.S. and the West's response to these emerging new militaries must recognize and accept that each FSU republic has the right to have armed forces to guarantee its sovereignty, but that the new militaries can be used in conflicts that can spill beyond their national borders. Among the principles underlying U.S. and Western long-term goals should be the willingness to provide assistance in creating the new civil-military structures and military systems and, simultaneously, the carefully but firmly expressed demands for strict adherence to existing international agreements, most importantly, the CFE treaty and the nuclear nonproliferation treaty.

DRR-265-A European Security Institutions for the 21st Century: Putting Theory into Practice. J. B. Steinberg. April 1993.

This draft examines what role institutions can play in meeting the objectives of the United States and its allies in post-Cold War Europe and offers some principles to guide decisionmakers. The draft argues that based on international relations and organization theory, institutions can play a number of roles depending on the institution's characteristics-its purpose (e.g., single vs. multiple), composition (e.g., homogeneous vs. heterogeneous),

procedures (e.g., rule-based vs. ad hoc), and origin (e.g., imposed vs. negotiated). The draft further argues that these insights from theory need to be matched to the specific interests of European states and threats to stability, such as threats to borders, internal conflict, failure of the democratic/market transition in former Communist countries, erosion of democratic structures in the West, stagnant or declining economies, and economic competition. The draft concludes by presenting ten specific policy recommendations for post-Cold War Europe, derived from a series of design rules of thumb, that broadly address the potential sources of conflict and the interests and objectives of the European states.

DRR-270-A Annotated Briefing: BW Terrorism in the 1990s. M. Eisenstein. April 1993. CONFIDENTIAL.

This draft discusses the "potential" of independent terrorist groups to employ biological agents or weapons (BW) against U.S. targets, domestically and abroad, and prioritizes among these groups for the possible use of BW. The draft argues that BW may not be weapon of choice for terrorists in killing only a few people because its use would be more complex than employing conventional methods. However, for killing tens or even hundreds of Americans, using BW could lower the terrorists' risk of being detected. The author found no terrorist objective that would call for killing many thousands of Americans, with the exception of retaliation against the United States for Operation Desert Storm; moreover, if killing many thousands of Americans is the objective of a terrorist act, it would have to occur domestically and would require significant support by a foreign state. The draft also concludes that as technical sophistication grows among international and domestic terrorist groups, the potential for BW use to inflict casualties and/or severe economic damage will increase.

DRR-275-A Some Ideas for Accelerating the Acquisition Process. E. M. Cesar, L. Horgan, K. P. Horn. April 1993.

This draft documents seven promising ideas to help the Army in accelerating its acquisition process. These ideas involve (1) changing the Concept-Based Requirements System (CBRS) to eliminate restrictions that are causing delays in the requirements generation process; (2) developing requirements from the Joint Task Force perspective; (3) reducing the linearity of organizations and procedures so that they better match the circular relationship between the research community, the developers, and the users; (4) pushing for reform of DoD regulations; (5) using prototyping to understand production and to gain operational experience; (6) turning special access programs into "skunk works" operations to better exploit the unique acquisition environment provided by special access programs; and (7) implementing an epoch-step acquisition approach to deal with the problem of the widening gap between what technology can provide and what the Army can acquire; this means planning according to epochs (i.e., points in time characterized by a distinctive way of acquiring technologies for a functional area) and designing the systems in each epoch across all Services to achieve Joint operability.

DRR-290-A Review of Civilian Community Quality of Life Literature: Is It Applicable to Army Communities? D. S. August. October 1993.

This draft reviews the literature on quality of life (QOL)—a vast body of literature that focuses primarily on civilian communities—and identifies five recurrent themes that would prove relevant in a study of military communities:(1) the importance of factors other than money; (2) the impact of city size and definition of community on assessments; (3) differences in QOL evaluation standards and outcomes among different demographic groups; (4) the distinction between objective and subjective QOL assessments and indicators; and (5) identification of life domains (and indicators within those domains) significant in QOL. In addition, this draft outlines a possible analytic framework for helping the Army evaluate its QOL programs with respect to how these programs influence personnel retention. The author states that further research would contribute to the formulation of specific action plans by developing a methodology that can be used to assess the implications of alternative policies on personnel QOL and therefore on re-enlistment decisions.

DRR-297-A Communication Performance and Shortfalls in Operations Desert Shield/Storm (U). K. Poehlmann. May 1993. SECRET NOFORN

(U) This draft looks at communications performance shortfalls during Operations Desert Shield/Storm (ODS/S). Examination of ODS/S situation reports and interviews with both military and commercial communications providers and managers lead to the assertion that operational, not technical, deficiencies predominated in the U.S. military's claims about communications shortfalls in ODS/S. Perceived shortfalls can be ameliorated by better management of existing systems as the Army prepares for future contingency operations. This includes paying serious attention to non-interoperable computer systems, unrealistic band with designations, abuses of priority systems, host-nation interfaces, and flaws in plans for deployment and distribution of communications equipment and data.

DRR-337-AF/A Cooperation with Turkey: Elements of a New Strategic Bargain and Implications for U.S. Policy. I. O. Lesser. June 1993.

This draft explores the elements of a "new strategic bargain" with Turkey in the context of bilateral and Alliance relations and the implications for U.S. policy. The draft examines both sides of the bargain, arguing that the West will look to Turkey to play a constructive regional role and will seek predictable security cooperation on both a routine and crisis basis, while Turkey will look to the West for reaffirmation of its membership in the Western "club." The study argues that bilateral relations with Turkey should be placed on a more

diversified and mature footing, with greater attention to non-defense issues, that Turkish security cooperation can no longer be taken for granted, that the U.S. should support Turkey's desire for an explicit reaffirmation of the NATO guarantee in extra-European scenarios, and that the adopting of a more active stance on the Bosnian crisis would make the greatest immediate contribution to relations with Turkey and would help to ensure a favorable climate for cooperation over the longer term.

DRR-343-AF/A Germany's Geopolitical Normalization. R. D. Asmus. July 1993.

This draft highlights the key factors likely to shape future German strategic thinking. The draft argues that such thinking will be driven, first, by a new set of German strategic interests in a radically altered geopolitical context in Europe-strategic interests focused around Germany's recognition that its vulnerabilities lie first and foremost along its Eastern arc: the zone of instability between Germany and Russia running from Northern Europe down through Turkey, the Caucasus, and Middle Asia. German strategic thinking will also be driven by the attitudes of Germany's allies and neighbors. To deal with its new challenges and vulnerabilities in Europe, Germany realizes that it desperately needs its allies and, above all, a strong strategic relationship with the United States. However, if Germany's allies fail to support or oppose Germany's efforts to, for example, transform the EC and NATO into the kinds of institutions that meet German needs, German attitudes toward its allies will change and Germany may be driven toward the kind of renationalization of German strategic thinking everyone wants to avoid.

DRR-347-A A Proposal for Heavy Battalion Reorganization Involving Headquarters Company and Echo Company. M. Goldsmith. June 1993.

This draft proposes a solution to the problem that the scout and mortar platoons assigned to Headquarters Company (HHC) do not normally receive the command support required to perform their doctrinally required tasks. The draft argues for the creation of a support company to absorb all the task force combat service support functions, while retaining the present staff support elements and special platoons in HHC. Additionally, Echo company, which a previous RAND study showed was underutilized, would be eliminated by dividing its forces into two six-vehicle platoons and by assigning one platoon to each of the HQ companies of all heavy battalions, both armor and mechanized. This would also solve the problem of security. The draft argues that command and training relationships would be strengthened by this arrangement, and that it would be easier for the HHC task force to make proper utilization of attachments such as artillery observers, ground surveillance radars, chemical and air defense scouts, and other nonorganic elements.

DRR-348-A Quantifying the Battlefield: Battalion and Below Command and Control Issues Seen at the National Training Center, Interim Report. J. Grossman. June 1993.

This draft analyzes command and control (C2) issues from NTC Take-Home-Packages during the period preceding the Gulf War to determine how frequently C2 problems occur and their impact on the battle outcome. Twelve significant C2 issues were found to be systemic with the Blue Force. Their impact is important because roughly one-half of the Blue Force battles lost at the NTC had significant C2 problems. Initial in-the-field research has indicated the magnitude and frequency of these problems have not changed since the Gulf War. The draft also addresses the issue of what technology can do to reduce or solve C2 problems, finding that only half the problems are amenable to a technological solution. Many of the technological solutions would need to focus on software, which must be readily accessible and user-friendly to be employed effectively during the battle. The draft argues that all the problems could, in theory, be solved by better training, although the most cost-effective approach will probably be a combination of better C2 equipment and training.

DRR-373-A Compensating Civilians on the Battlefield. E. G. Keating. July 1993.

Given that civilians will continue to be needed in future Army operations, this draft considers how they should be compensated. The draft suggests a number of methods of inducing civilians to accept battlefield assignments. One is for the Army to offer government-employed civilians two levels of compensation-one for peacetime and a higher one for wartime. Another is to pay different premia for different skills and/or to eliminate earnings caps; the current system appears to have a bias against high-skill workers. The draft argues that the Army could allow its contractors to pay their employees more during conflict and to prudently overstaff. It also argues that because most civilian life and health insurance policies do not cover injuries or death caused by war, the government should either make such payments or reimburse contractors for doing so.

DRR-413-A Army C4I Architectures: A Preliminary Analysis. P. Allen, E. Cesar, L. Jamison, G. Huth, E. Harris. September 1994.

The end of the Cold War has called into question many of the assumptions underlying our view of conventional military operations. We no longer face a well-known threat in a thoroughly prepared theater of operations. How we perform in future operations, whether they are combat or noncombat, will depend on our ability to gather and disseminate information rapidly and efficiently. This document provides guidance for (1) promulgating new policy directions; (2) designing improved information transfer architectures; and (3) conceptualizing and evaluating new command, control, communications, and computer (C4) systems based on emerging new technologies to support commanders during contingencies at the tactical and operational levels. The authors analyze the Army's current C4 system and projected improvements to it and identify its advantages and disadvantages. Next, they expand and apply a

methodology for quantifying the physical and informational attributes of C4 architectures. They then identify three current information trends that seem most promising for shaping future architectures. Finally, the authors devise and evaluate alternative architectures that incorporate these three capabilities.

DRR-415-A Quantifying the Battlefield—Battalion Level Command and Control Issues Seen at the National Training Center. J. Grossman. July 1993.

This draft expands on the work reported in DRR-348-A, presenting the results of in-the-field research conducted to verify the problems raised in the NTC Take-Home Packages. The study finds that roughly half the Blue Force battles lost at the NTC had significant command and control (C2) problems. These problems result primarily from training deficiencies; however, new C2 computer-based equipment can resolve or ameliorate about half the C2 problems seen at the NTC. We also found that for C2 equipment to be useful, designers need to investigate and emphasize battalion and below command and control information architecture as much as the equipment itself. Other issues raised by this study focus on improvements in how the units operate, including the need for units to generate more detailed plans, do more analysis to enhance the plans' chances of success, manage the battle preparations, report more often and more accurately (during the battle), and track the battle more accurately in the Tactical Operations Center.

DRR-421-A Cambodia: The Crisis in U.N. Peacekeeping and U.S. Policy. M. D. Swaine. July 1993.

This draft provides details and analysis of the current situation facing the UN peace effort, presents an assessment of alternative future scenarios, and suggests some general principles that should guide U.S. policy. The draft focuses on five research questions. In terms of the status of the UNTAC effort, the draft argues that UNTAC is failing in many key areas, facing both external obstacles (e.g., no reconciliation among factions) and internal obstacles (e.g., the rigidity, vagueness, and broadness of the UN mandate). The draft also argues that although the Khmer Rouge can severely disrupt the UN peace process, it is not poised to take control of Cambodia. Given the above situation, the briefing argues that the "least bad" outcome of the situation is any coalition government, but preferably one dominated by FUNCINPEC, and that the UN can do very little to attain this option. The draft concludes that the optimum U.S. strategy should be conditional support for a continued UN presence.

DRR-422-A The Cost Consequences of Forming a DoD School of the Americas (DODSOA). M. G. Shanley. July 1993.

This draft presents the results of a cost assessment of a proposal to create a joint DoD School of the Americas to oversee all training of Latin American military (and civilian) personnel conducted in the Spanish language, and of an alternative proposal calling for complete consolidation of training to one location. The study finds that if cost is the primary consideration in evaluating the DODSOA proposal, neither proposal is recommended. The main reason is that the service schools currently teach different types of courses, and without the potential to significantly reduce course redundancy, the idea of a DODSOA lacks one of the primary characteristics that make centralization of training a good idea. However, if cost is considered secondary to the other goals of the DODSOA, then the study argues the Army should consider "more coordination" as an alternative because the alternative could achieve some of the objectives without the potential cost of an organizational change.

DRR-431-A Video Processing for FLIRs. R. M. Zwirn. July 1993.

This draft provides initial results in identifying video processing techniques applicable to second-generation Forward-Looking Infrared (FLIR) sensors. The draft begins by describing the configuration of various FLIRs and by showing the benefits of making provisions now for evolving upgrades in processing. It then identifies how processing's diversified rates can expand the number and scope of upgrade strategies. The draft concludes that second-generation FLIRs must include processing to control its operating parameters effectively and that this processing can also fulfill other roles, such as providing performance enhancements. For example, zoom enlarges details, frame averaging helps penetrate the atmosphere, and eye-matching selects significant intensities. The draft also argues that future fielded FLIRs can quickly benefit from improved algorithms and that first-generation FLIRs can also be quickly upgraded to provide improved performance for such areas as training, doctrine development, and rapidly emerging contingencies.

DRR-444-A Improving Participation of Civilians in Military Operations. J. R. Bondanella, E. G. Keating, W. L. Spencer. July 1993.

This draft summarizes the results from the project. It argues that the current personnel planning system needs to refocus its vision to create a system where motivated civilians want to deploy, stay, and deploy again in the future. It further argues that although senior army leaders prefer a policy of voluntary participation because coercion does not work well, the current system frustrates volunteerism. As shown in ODS, there was relatively little financial incentive to volunteer, which was especially true for government civilians in high demand. The draft also argues that organizational practices dampened volunteerism in recent contingencies, that peer information discouraged participation by potential volunteers, that current rules are unclear but very important, and that planners and leaders do not have an attrition concept. The draft concludes with some general recommendations for a future system and policies.

DRR-449-AF/A Dealing with Ethnic Conflict in Central Europe and the Balkans: The Case of the Hungarian Minorities. T. S. Szayna. August 1993.

This draft examines the potential for conflict over the ethnic Hungarian minorities in the Danube basin in the context of potential dangers to stability in Europe posed by ethnic conflict. The author argues that Hungary is in a paradoxical situation. On the one hand, Hungary is viewed in the West as one of the former communist countries most committed to succeeding in implementing political and economic reform. On the other hand, Hungary is most vulnerable to a national radicalization centered on the minority issue, because it has the largest and most explosive ethnic problem in the former Eastern Europe. The author states that escalation could destabilize the region and end the successful process of transformation in the former communist countries of Europe, as well as have far-reaching negative consequences on Western Europe, most of all Germany. The author further argues that the challenge for the U.S. is to limit the spread of ethnic tensions, prevent the escalation of tensions into militarized conflict, and contain any incidents of militarized ethnic conflict so that they do not lead to a border or regional war.

DRR-455-A Cyprus: Implications of Traditional Peacekeeping for the U.S. Army. M. C. Harrell. August 1993.

This draft is one case study in a series that catalogs and assesses the range of missions and requirements the U.S. Army is likely to face in the future with particular attention to: (1) Army roles and missions providing relief and humanitarian assistance to refugees; (2) involvement, and the implications of intervening in internal ethnic conflicts; and (3) peace enforcement and peacekeeping operations in urban settings. The author compares the peacekeeping policies of the United Nations Forces in Cyprus (UNFICYP)—which remained uninvolved and impartial in local conflict—with the current policies of the U.S. Army, which is to respond or intervene (e.g., in the current Somalia situation). The issue of mission termination, an obvious problem in the 29-year-old mission on Cyprus, is also discussed. The author concludes that unless the U.S. military can provide a unique capability necessary to peacekeeping, the U.S. military is more appropriate to peace enforcement missions than to traditional peacekeeping missions such as UNFICYP.

DRR-466-A/AF Constraints on Regional Deterrence After the Cold War. J. Arquilla. August 1993.

This draft develops and evaluates a set of policy options that aim at either mitigating or managing the problems posed by various deterrence constraints in the post-Cold War world. The author states that the U.S.'s cumbersome domestic politics, straitened economic condition, and distant geographic position may impede its ability to deter aggressive acts in various regions of the world. The author compares the 19th century Monroe Doctrine of the United States, which adopted one general deterrent commitment toward one region, Latin America, with that of the British Empire, which adopted a regional perspective that included all the regions of the world. The U.S. policy was successful and was maintained even while many other regions of the world were torn by conflict. The British policy, on the other hand, left the British overextended and made them an unwitting contributor to the fomenting of world war. The draft concludes by stating that if the United States adopts this limited approach to regional security, then the imperial trap that ensnared Britain can be avoided and the rise of great powers willing to confront the United States can be forestalled.

DRR-502-A Economic Perspectives on Military Housing. E. G. Keating. October 1993.

This draft discusses housing provided by the military and the private sector from both the military's perspective and from an individual soldier's view. The draft argues that the existing stock of on-post housing will deteriorate as money becomes scarce and maintenance is deferred. The author discusses two possible scenarios. Under the more optimistic scenario, more and more base housing will be sold to private concerns or demolished. The role of the private sector will enlarge. There will be an increase in soldier homeownership. The government will spend more money on housing allowances, but on net it will save money because of reduction in housing construction, maintenance, and repair. The more pessimistic scenario is that the military will retain its deteriorating housing stock and start mandating that soldiers inhabit them to full capacity. As a result, the military would end up with a population of soldiers who inhabit base housing only reluctantly as part of an effort to use the government's declining housing stock, which may reduce morale and reenlistment rates.

DRR-509-A Tailoring the Battle Command Training Program to Corps Training. D. R. Worley, J. P. Kahan. September 1993.

In 1987, the Army established the Battle Command Training Program (BCTP) to provide a realistic means of training and assessing each division and corps within the Army. This draft examines how the BCTP might be tailored to the training needs of the corps echelon. The authors first define alternatives related to seminar audience composition, seminar organization, BCTP staffing, and Warfighter Exercise (WFX) organization and then analyze how well each option can fulfill training objectives in team building, understanding and executing corps operations, and training efficiency. The analysis concludes that each option meets some objectives at the expense of others and evaluates the options in terms of trade-offs.

DRR-524-A Afghanistan: Conflict, Refugees and Demographic Change. G. E. Fuller. October 1993.

This draft examines the implications of civil war and international conflict in Afghanistan from 1979 to 1993,

focusing on how the conflict affected the civilian population and on its implications for future intervention operations by the U.S. and other countries or international organizations. The author argues that the kind of conflict that broke out in Afghanistan and the amount of refugees it produced is hardly a unique incident and is likely to be repeated frequently in coming decades. The author also states that while the U.S. military has not so far been involved in the Afghan conflict and refugee problem, there has been intense American government involvement in many aspects of the problem. For example, the U.S. was involved diplomatically with Afghanistan and the entire operation has had a major impact on U.S. relations with Pakistan. In addition, U.S. non-governmental organizations have also played extremely active roles in Afghanistan. The Afghan case is highly instructive for its sequence of events, the character of its refugee dilemma, and the social impact of exile on the large refugee population.

DRR-532-AF/A Poland and the Soviet Successor States. T. Szayna. October 1993.

This draft examines Poland's strategic position in post-Cold War Europe and it's relations with the newly emerged neighbors to its east. Poland has attempted to establish good relations with all its eastern neighbors (despite discriminatory policies faced by the ethnic Poles in Lithuania) while simultaneously pressing for integration into Western economic and security structures. However, despite the accommodating Polish policy, a variety of scenarios leading to tensions and even conflict between Poland and its eastern neighbors are possible. These scenarios center on events beyond Polish control (e.g., Ukrainian or Belarusian disintegration). If Polish membership in a security organization of which Germany is a member fails to materialize, then Poland will be forced to seek security guarantees somewhere else. This may lead to: (1) an alliance of the have-nots (the former communist European states west of Russia), with Poland and Ukraine forming its main axis; or (2) an autarkic and xenophobic Poland. Both options contain the possibility of Poland acquiring nuclear weapons. It is in the U.S. and Western interest to see Polish integration into Western security and economic institutions.

DRR-534-A Resupply in Force-Projection Operations: Evidence from Restore Hope, Desert Shield/ Storm, and Just Cause; an Annotated Briefing. M. L. Robbins. October 1993.

This draft examines the ability of the current DoD distribution system, and its Army component, to move high-priority items rapidly to the customer. The author uses recent operations in central America, Southwest Asia, and the Horn of Africa as examples of force projection missions in which strategic resupply was critical for theater support. In these operations, the standard distribution system showed limited ability to discriminate among the priorities of needed items, with the lowest priority item sometimes moving just as quickly, or more quickly, as the highest priority item. In each mission, "side channels," either ad hoc, created specifically for that operation, or serving just part of the deployed forces, were far more effective in responding quickly to theater needs. The author concludes that: (1) a future system should retain selected aspects of each of these side channels, emphasizing rapid in-theater monitoring of critical requisitions and direct communication between representatives of the National Inventory Control Point (NICP) in the theater and in CONUS; and (2) the system needs a way of communicating these high priorities between the NICP and the non-Army supply depots and air ports of embarkation.

DRR-546-1-A Stockage Policy Research and LAM Exercise Support. J. B. Abell. October 1993.

This draft presents an annotated briefing that proposes a body of research in stockage policy in support of the stockage-related issues of the Army's Louisiana Maneuvers (LAM) and that proposes support to exercises conducted as part of the LAM. This research has four principal thrusts: (1) war reserve policy; (2) war reserve stockage policy; (3) war reserve requirements determination; and (4) allocating war reserve assets to units in execution. In addition to these principal research thrusts, RAND will develop concepts for including logistics issues in simulations, exercises, and field tests. The draft also discusses RAND's research approach.

DRR-547-A ACAC: Anticipating Combat Ammunition Consumption, Senior Analysts' Review. J. Marti, K. M. Beam. October 1993.

This draft presents ongoing work on the Arroyo Center's ACAC project that is developing a decision support system that provides a high-resolution view of high-cost, high-weight munitions consumption based on computer simulation. Conventional techniques of modeling ammunition consumption rely on tables developed over many years and do not account for advances in munitions technology and tactics or non-linear and highly mobile combat operations. In this work, JANUS-A, a high-resolution combat simulation, is used to refine ammunition consumption modeling. The draft describes the Intelligent Operations Associate that automates much of the low-level decisionmaking during JANUS scenario construction. The draft discusses interfaces with supporting databases, such as the Army's TOE A57, and with high resolution terrain, DMA ITD. The draft then describes the automated Intelligence Preparation of the Battlefield, route planning, and force laydowns dependent on METT-T, and discusses the experimental design and presents some initial results. Finally, the draft presents the current VV&A status that includes succesful implementaions on several platforms using differing systems.

DRR-550-OSD/A Rapid Force Projection Technologies: An Interim Report. K. W. Brendley, R. Steeb, T. G. Covington, S. Eisenhard, G. Halverson, T. Herbert, P. Kantar, K. Littlefield, J. Marti, L. Melody, W. Sollfrey, A. L. Zobrist. October 1993.

This draft examines the Rapid Force Projection Initiative (RFPI) and breaks it down into six areas of discussion: (1) RAND's Role in RFPI; (2) Experimental Plan; (3) Modeling and Simulation Approach; (4) Scenarios; (5) Experimental Results and Observations; and (6) Future Work. This draft concentrates on the airliftable portion of U.S. Army forces deployed to areas of potential or actual conflict. The authors had several interim observations. First, baseline force with currently planned Army improvements are unable to fight and survive against heavy force in open terrain. Second, LCV/FOG-M allows the light force to defeat the heavy force in defense and survive. Third, signature reduction is required for LCV/FOG-M to survive against future threat. Fourth, wide area mine (WAM) is an effective force multiplier and fifth, the performance of standoff line-of sight (LOS) systems such as kinetic energy missiles (KEM) is greatly enhanced when fighting in combined force with non-line-of-sight (NLOS) systems.

DRR-551-A Integrating JANUS and BDS-D to Support the A2 ATD (Project Update). K. W. Brendley, J. Marti. October 1993.

This draft presents an annotated briefing that discusses progress on a project integrating the constructive model JANUS and DIS that is being conducted jointly by TRAC-MTRY, the Naval Postgraduate School, and the Arroyo Center. The project supports AMSAA in their Anti-Armor Advanced Technology Demonstration (A2 ATD) effort to develop a DIS methodology for mission area analyses. After discussing some of the differences between JANUS and BDS-D—including mismatches of battlefield scale, terrain resolution and presentation, object resolution, event time, and scenario— the draft focuses on the Arroyo Center's efforts to modify JANUS, which consist initially of system name correlations, software connections to DIS, and terrain and algorithm modifications. The draft then discusses the project's next steps, which include developing tools for the automatic building of JANUS 4.0 terrain databases; expanding the DIS interface software and verifying its operation in a repeatable setting; and building test jigs to verify code being incorporated from other models such as GROUNDWARS.

DRR-552-1-A/AF Theater Level Campaign Model and Nonlinear Combat Modeling Toolkit. L. R. Moore, R. J. Hillestad. December 1993.

This draft discusses the Theater Level Campaign model/Non-linear Combat modeling toolkit (TLC/NLC) and is seeking to remedy deficiencies in current theater-level models in several ways. First, the researchers are continuing to develop a selectable-resolution theater- and operation-level model suitable for the type of issues expected to demand attention into the 21st century. Second, the model is calibrated to models with higher resolution but more limited scope. Third, the researchers are creating a superior environment for analysis relying heavily on graphical user interfaces. The draft states that TLC/NLC is most applicable to studies at the operational level of warfare where resource availability and allocation, operational doctrine, and the attainment of strategic goals are key elements. In addition, TLC/NLC may be used to screen new capabilities to determine how much a new weapon system contributes to the outcome of a campaign or how much additional capability is required to make a significant difference. TLC/NLC can also contribute to the understanding of the uncertainties facing decisionmakers.

DRR-553-A Measuring Army Deployment Risk: Methodology and Modeling Approach. K. J. Girardini, B. Nichiporuk, D. Kassing, R. E. Stanton, B. Leverich, B. Lewis. November 1993.

This draft presents a framework for dealing with the problem of measuring in mission-oriented terms the risk levels of "less than doctrinal" Army support force (combat support, CS and combat service support, CSS) deployments overseas. Measuring risk in mission terms requires a methodology that links support capabilities and combat accomplishment. Rather than develop another combat model, the researchers developed a methodology that links support to combat planning and execution functions of a new RAND model of air and ground combat. This methodology has two steps: (1) using linear programming methods to develop lift-constrained deployment schedules for Army support forces; and (2) integrating a "logistics evaluator" to assess the logistics supportability of combat plans in the combat model. The authors state that the completed methodology should (1) help Army planners to better balance CSS forces within deployment constraints; (2) assess the impact of new support doctrine; and (3) justify CSS deployment needs.

DRR-555-A Force Requirements for Stability Operations. J. T. Quinlivan. October 1993.

This draft focuses on the force requirements that would be generated by American acceptance of increased responsibility for "stability" operations in a post-Cold War environment. Such operations can be thought of as covering the spectrum of missions that include the occupation of territory as well as counterinsurgency operations. The author states that increased urbanization of Third World countries presents the challenge of stability operations in built-up areas with populations over a million. The author also states that the likely duration of a serious stability operation before any transition to indigenous or other forces can be carried out highlights the total force requirements and the need for a rotation base. In addition, the total force requirements for such protracted operations are the systematic costs imposed on the military in retention and skill levels for personnel repeatedly exposed to hazardous situations. The author concludes by stating that any sizeable peace enforcement or intervention operation removes U.S. capability to conduct two major regional contingencies.

DRR-559-A Islam and the West. G. E. Fuller, I. O. Lesser. October 1993.

This draft examines the controversial issue of the relationship between "Islam and the West" and it implications for both Western and American policy as well as for the Muslim world. The authors take the popularized concept of a broad cultural and political confrontation between the two civilizations and attempt to break it down into its component parts. What are we really talking about when we discuss "Islam and the West?" What are the grievances on each side— historical, psychological, military, political, economic, and social? All these issues are examined and put into a policy context. The authors maintain that only by examining each of these critical sub-issues in its own right will the two regions of the world be able to deal with frictions that normally arise—as between any two regions of the world. The authors do not believe that the next ideological confrontation in the world will be that of "Islam vs. the West," but they caution that both parties will need to objectively treat the real sources of friction on both sides to prevent the idea of "Islam vs. the West" from becoming a self-fulfilling prophesy.

DRR-560-A The Marine Barracks Bombing of 1983: Lessons from the American Participation in Multinational Force 2: A Case Study. J. C. Schmeidel. August 1993.

This draft examines the deployment of American military forces in Beirut between 1982 and 1984 as part of the First and Second Multinational Forces sent by the United States, France, Italy and Great Britain in an attempt to stabilize the political situation of Lebanon. Following a discussion of the implications for force structure, doctrine, and training, the author presents several strategic lessons to be learned from the multinational forces 2 (MNF 2) intervention, including: Undertaking a peace-making mission in volatile circumstances where the inserted forces are likely to come under attack and not allow retaliation will invite disaster; The concept of "presence" is incompatible with the ethos and training of an offensively oriented military formation such as the Marines; Prompt distribution of intelligence to all not just some consumers, and most especially to the tactical commander, should be top priority; The performance of U.S. forces, particularly the Marines, could profit from more training in military operations on urban terrain (MOUT) and in techniques of peacekeeping patrolling in hostile civilian zones where rules of engagement are restricted.

DRR-562-A The Role of Special Operations Forces in Peace Operations. J. M. Taw. October 1993.

This draft analyses the role and utility of U.S. special operations forces (SOF)—including the U.S. Army Green Berets, Rangers, and Civil Affairs and Psychological Operations forces; the Naval Special Warfare Groups (SEALs and special boat squadrons); and the 23rd Air Force—in peace operations. The author argues that such forces are ideally suited to meet requirements allowing them to operate in the emerging conflict environment. Although conventional military planners are beginning to recognize the value of SOF in the post-Cold War, their understanding of how to efficiently and effectively employ SOF is still superficial. Also, the author states that for SOF to be most useful in peace operations, peace operations themselves must be better understood than they currently are. For example, the distinction between peacekeeping and peace enforcement must be recognized so that strategy, planning, force structure, and equipment are appropriate to the context. The role of SOF will be different where U.S. military forces are universally welcomed than in situations where there is resistance to a foreign military presence by one or more factions.

DRR-569-A The Liberation of Kuwait City: Urban Operations in Ongoing Conflict. M. E. Morris. November 1993.

This draft focuses on the military and political components of the liberation of Kuwait City from Iraqi forces on February 25, 1991. The urban combat that took place during the Iraqi crisis and war was primarily confined to three instances: (1) the initial capture of Kuwait City by combined Iraqi forces on August 2–3, 1990; (2) actions in Khafji in late January and early February 1991; and (3) the recapture of Kuwait City on February 24, 1991 by allied forces. Both Khafji and the retaking of Kuwait City called for U.S. planning and reliance on U.S. military doctrine pertaining to Military Operations in Urbanized Terrain (MOUT). The Gulf War presented an opportunity for internationally supported action and laid to rest the question of whether the U.S. could perform militarily. The author states that the United States must retain an appreciation of the consequences of both moral certitude and military action. The author also states that while coalition actions accomplished both stated political objectives and associated military ones, the situation in the Middle East is far from settled.

DRR-573-AF/A The Commonwealth of Independent States: The Road Back to Economic Integration. A. S. Becker. November 1993

This draft examines the Moscow-led effort to reintegrate the economies of most of the Soviet successor states after an initial period of accelerating distingration. A year after its December 1991 proclamation, the CIS seemed to consist of three groups: (1) the dominant power, Russia; (2) countries that believed they had a viable future outside an integrated CIS—Azerbaijan, Georgia, Turkmenistan, Ukraine—or that were struggling to find their political identity—Moldova; and (3) countries that believed their future was associated with Russia and the CIS—Armenia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. In 1993, only Turkmenistan remained in the second group; the others moved or are clearly moving into the third group. This resulted from the weakness of the non-Russian states and from Russia's power to frame the terms of association with it. This shift must be considered of potentially cardinal importance in international affairs, significantly affecting the power of Russia and its role in the strategic zones of Eastern Europe and the Near and Middle East.

DRR-579-A/AF Eastern Europe Between Russia and Germany. F. S. Larrabee. November 1993.

This draft addresses Eastern Europe's security concerns in the context of relations with Germany and Russia. The author examines four strategies open to Moscow to deal with Eastern Europe. The first strategy would be a bilateral condominium with the United States—through NATO— to guarantee the security of Eastern Europe. Second, would be to delay East European integration into NATO as long as possible in the hopes that NATO will collapse or atrophy and push instead for enhancing pan-European cooperation. Third, would be an explicit or implicit "deal" with the West involving a tradeoff between Russian agreement to East European membership in NATO in return for Russia being given a free hand in the near abroad, including Ukraine. A final option would be a Russian-German condominium in which Russia and Germany share responsiblity for Eastern Europe and guarantee its security. The author argues that if NATO fails to address East European security concerns, more directly and systematically, the East European countries could feel compelled to search for alternative security arrangements.

DRR-588-A Weapons Proliferation and Military Integration: An Iranian Threat Assessment (U). J. A. Isaacson, B. G. Chow, P. Propper, B. C. Schwarz. December 1993. SECRET NOFORN WNINTEL NOCONTRACT

(U) This draft addresses the emerging threats to the U.S. Army resulting from conventional proliferation in the coming decade. In the past, conventional approaches to the proliferation problem have relied on threat assessments consisting primarily of manpower and order of battle tabulations, paying little attention to factors critically important to operations on the modern battlefield. Recognizing that high-technology weapons may require specialized doctrine, tactics, training, and support and that deficiencies in any of these areas may eradicate the potential advantages of fielding leading-edge weaponry, this assessment gives central consideration to the integration issue. Technology's impact on future conflicts is greatly limited by what is available for export. The first half of the draft discusses important trends in the arms export market and examines which of the available systems/technologies are most important. The second half examines whether Iran is a potentially threatening importer and whether it is likely to use its imports effectively. The authors conclude with an assessment of the Iranian proliferation threat.

DRR-594-AF/A Ukraine: Between Russia and Independence. E. B. Rumer. January 1994.

This draft examines Ukraine's transformation since the breakup of the Soviet Union, assesses the prospects for Ukraine's survival as an independent state, and identifies key policy challenges facing the West. Although Ukraine has attained formal independence from Russia, it finds itself caught in a pattern of internal crises. Underlying these crises are: (1) the postponement of internal economic reform; (2) a gridlocked legislative process; (3) the radicalization of the opposition; (4) escalating tensions with Russia; and (5) growing regional and interethnic rivalries. In addition, nuclear weapons remain a key issue. The author argues that the U.S., while reaffirming its commitment to Ukraine's territorial integrity, condemning secessionists' claims, and urging Russia to do the same, should acknowledge the lack of alternatives to Russian intervention in the event of a civil war in Crimea. However, Russian action under the aegis of the international community would be preferable to unilateral action. Considering the possible spillover into neighboring countries, reincorporation into greater Russia might be the only realistic—albeit not attractive—solution.

DRR-606-A Assessing Changes to the Total Army School System. J. D. Winkler, C. Moore, G. A. Moody, M. G. Shanley, J. C. Crowley, J. M. Polich. December 1993.

This draft presents a framework, methods, and data requirements for evaluating the effects of changes in the organization and management of the Total Army School System, with special attention to the prototype regional school system being established in the southeastern United States. The evaluation analyzes changes in training inputs and outputs across geographic regions and over time, while measuring school system performance in three areas: (1) meeting training requirements; (2) efficiently using resources; and (3) providing quality instruction. A fair evaluation requires a fully implemented program, which will occur throughout fiscal year 1994. Moreover, routine program operations are not likely to be observed before fiscal year 1995 at the earliest. These considerations indicate that baseline data collection can begin in the initial year, but at least two years are needed before a full, outcome-oriented evaluation of the prototype can be performed. Hence, decisions about modifying or expanding the prototype, if they are to rely on outcome-oriented evaluation data, can be made no earlier than fiscal year 1996, after routine operations are achieved and occur over a complete training year.

DRR-611-1-A Re-Engineering the Requirements-Generation Process. C. Wong, K. P. Horn, L. Horgan. August 1994.

This draft examines the purpose of the current Mission Need Statement (MNS) procedure, how well it acomplishes its overall goal within the Department of Defense (DoD), and whether there is a better way to do it. The authors argue that the procedure's purpose is to formalize oversight of the procedures in the earliest stages of the acquisition cycle and that although the current procedure accomplishes this purpose, there are areas for potential improvement. For example, the Army can strengthen its review and oversight processes to ensure that MNSs refer to updated guidance, that timing and priority are discussed, and that when appropriate, more detailed information is provided in its discussion of nonmateriel solutions. As for whether there is a better

way, the authors recommend relaxing the requirement that all MNSs follow similar procedural approval steps, reducing the overall complexity of the MNS approval process, and tightening the internal oversight.

DRR-633-A Future Armored Combat Systems: Options for Indirect Fire and Non-Line-of-Sight. R. Steeb, K. W. Brendley, T. G. Covington, J. Matsumura. May 1994.

This draft concentrates on long range, precision fire systems for the extended close battle (out to 30 km or so) and the deep battle (out to and beyond 100 km). The authors developed two East European scenarios suited for examining heavy force options. The first, situated in Poland, places a heavy Blue Brigade in a defensive position against a balanced Red division in moderately open, hilly terrain. The second involves similar forces in more rugged terrain with shorter lines-of-sight in Romania. The primary targets in both scenarios are armor. Wargames using these scenarios were run employing Janus augmented with other models. The systems and technologies examined include MLRS, NLOS, Apache, Abrams, Bradley, M109 SP Howitzer, and wide area mines. The simulation results (which apply only to these scenarios, and do not model joint operations with air and naval assets) indicate that certain non-line-of-sight and indirect fire systems should be able to strongly change the lethality and survivability of heavy forces. The authors recommend that more intensive examination of these systems should be carried out within the R&D community.

DRR-642-A Weapons of Mass Destruction in North Africa and the Levant: A Survey of Mass Destruc-tion Capabilities and Delivery Systems in Selected Countries. A. J. Tellis. February 1994.

This draft identifies programs relating to weapons of mass destruction (WMD) and catalogs the delivery systems possessed by seven North African and Middle Eastern states: Morocco, Algeria, Libya, Egypt, Syria, Iraq, and Iran. The coercive capabilities of these states can be divided into three categories: (1) states that do not possess either WMD or sophisticated delivery systems and show no inclination to acquire them; (2) states that possess or seek to acquire some or all kinds of WMD, together with their associated delivery systems, but do not possess the requisite domestic industrial base to undertake such efforts with a high degree of autonomy; and (3) states that possess or acquire some or all kinds of WMD, together with their associated delivery systems, and also possess a domestic industrial base of some breath. The author concludes that the proliferation of WMD and sophisticated strike systems in North Africa and the Levant must be carefully monitored for their ability to constrain U.S. policy in Europe and the Middle East.

DRR-679-A/AF The Twin Arcs of Crisis: New Strategic Challenges for the United States in Europe and the Former Soviet Union. R. D. Asmus, R. L. Kugler, F. S. Larrabee, I. O. Lesser, T. Szayna. March 1994.

This draft provides a geopolitical assessment of the post-Cold War strategic landscape in Europe and Russia and an overview of the unfolding debate over the future of the Atlantic Alliance. The authors argue that U.S. policy has again arrived at a historical watershed where it faces the issue of whether American interests are sufficiently engaged to justify committing U.S. political will and military power to seek to address European instabilities and, if so, how. Three central conclusions can be drawn from this study for the U.S. military: (1) Europe will be reborn as a theater for U.S. defense planning, not necessarily because major conflicts or war loom but simply because a great geostrategic drama is unfolding which will also be shaped and influenced by defense preparations; (2) NATO expansion is no longer a question of whether but when and how—and how far. Moreover, Bosnia has shown that the Alliance is already being drawn into conflicts beyond NATO's borders; and (3) an expanded Alliance role along the twin arcs will catalyze a debate over NATO institutional adaptation and reform required to deal with new missions.

DRR-682-A Ammunition Basic Load Strategies in the Contingency Force Planning Environment. D. M. Oaks. March 1994.

This draft addresses Ammunition Basic Load (ABL) issues facing units of the XVIII Airborne Corps. The draft has three objectives. The first was to understand how Corps units operationalized the term "ABL"; the second was to evaluate the level of support for units from both home installation Ammunition Supply Points (ASPs) and the wholesale system (depots). The third and most important objective was to develop a strategy for the Corps to begin adapting ABL determination and procedures to better meet current and future needs. The two major findings of this work are: (1) no single ABL strategy would adequately meet the needs of the XVIII Airborne Corps divisional or echelon above division units; and (2) XVIII Airborne Corps divisional and echelon above division units should prepare detailed ABL storage and support plans based on unit deployment timelines and deployment scenario needs.

DRR-709-A Strategies for Redesigning the Army's Support System. M. Robbins, R. Eden. April 1994.

The Arroyo Center is examining strategies for redesigning the Army logistics system to meet the demands of the post–Cold War era. This draft documents a briefing delivered to the Aerospace Industries Association, Spare Parts Committee, April 26, 1994, in Orlando, FL. In contrast to the system that supported the forward-deployed Army of the Cold War period, the current era requires an Army logistics system that is leaner, more flexible, and more responsive to a broader range of missions. The authors suggest that the logistics system can be improved through three strategies. First, focus the entire system on the support needs of the operational commander (the

customer). Second, design and manage processes to be more responsive and efficient. Third, design and redesign weapon systems to be more supportable. These strategies synthesize and integrate management and technological innovations demonstrated by commercial firms, and by some elements of the Department of Defense logistics system.

DRR-715-AF/A The Twin Arcs of Crisis: Eight Country Studies. R. D. Asmus, A. S. Becker, F. S. Larrabee, I. O. Lesser, E. B. Rumer, T. Szayna. May 1994.

This draft presents a series of individual country studies completed for a project entitled "The Twin Arcs of Crisis: New Strategic Implications for the United States in Europe and the Former Soviet Union." The first two chapters examine the future geopolitical orientation of Germany and Turkey, which have become more important as U.S. allies because of the changes in Europe since the collapse of communism. Chapter 3 examines those factors fueling the "search for alliance" in the region that have produced a strong desire to be rapidly integrated into both the European Union and NATO. Chapters 4 and 5 examine in some detail the specific implications of the collapse of the Yalta and Versailles peace orders for Poland and Hungary, respectively. For example, political forces exist in Ukraine, Belarus, and Lithuania that question Poland's present eastern borders or try to make an issue out of the fate of ethnic minorities in the region. Chapters 6 through 8 examine three different aspects of the new dynamics of Russian policy toward the newly independent states as well as Eastern Europe.

DRR-730-A Automated Path Planning for Simulation. J. Marti, C. Bunn. 1994.

This draft documents the results of the "Anticipating Combat Ammunition Consumption" project and describes research undertaken to improve and validate the automated route-planning algorithms used by the RAND Integrated Simulation Environment (RISE). Using a route planner whose sole criteria is minimizing distance and elevation change, the authors analyzed the effects of terrain resolution on path quality and compared human- and computer-generated paths. The authors reached several conclusions: (1) minimizing cost matrix size provides a significant reduction in computation time; (2) using bilinear interpolation of elevation generates routes less sensitive to orientation and data granularity; (3) using higher resolution terrain data provides a linear improvement in path quality for exponential increasing data space; (4) increasing path resolution does not increase path quality without a corresponding increase in data resolution; and (5) the route planner can be tuned to match human performance for some measures. This draft presupposes some knowledge of computer simulation, geographic information systems, and artificial intelligence techniques.

DRR-732-A Military Map Iconography. J. Marti, C. Neerdaels. June 1994.

This draft describes research undertaken to improve the display of combat simulations on synthetic terrain for the RAND Integrated Simulation Environment. The Intelligence Preparation of the Battlefield (IPB) is a graphical adjunct to the Operations Order. The current practice, with planners working on plastic overlays fitted to a paper map, is difficult to share electronically. The advent of computer-meditated planning will move much of this activity to computer mapping systems. Military map iconography presents numerous problems for computer generation of map displays. Among these are: (1) the representation of standard military symbology; (2) the representation of units or vehicles by icons; and (3) the depiction of areas and movement plans. The authors present some techniques for improving the generation of these symbols. For example, they describe a scheme for automatically deriving unit symbols from an English-like description. With a suitable parsing program, this could be used to create a unit's symbol directly from the Tables of Organization and Equipment (TOE). The authors also present mechanisms for display of unit boundary lines, movement arrow and other boundaries.

DRR-733-A Dyna-METRIC Version 4.7: A Sustainability Assessment Model. P. Boren, K. Isaacson. June 1994.

Dyna-METRIC is a logistics capability assessment model that evaluates weapon system sustainment as driven by the availability of key logistics resources, principally spare parts. This draft describes an Army version of Dyna-METRIC (Version 4.7), an extension of the standard Air Force version (Version 4.4). The new version was developed specifically for the VISION Assessment System (VAS), a decision support tool intended to help Army logisticians with readiness and sustainment planning through resource management in both peacetime and wartime environments. To make the model more appropriate to the Army, the authors incorporated the following enhancements: (1) a fourth echelon of support; (2) operating tempo by usage basis; (3) time-varying performance goals by units (4) more suitable handling of spares computations; (5) the capability for one component to represent other like components not explicitly modeled; (6) a separate report that summarizes the cost of computed stock levels; and (7) an efficiency modification that shinks Dyna-METRIC from five programs to four.

DRR-734-A Data Collection Plan for Assessing the Total Army School System. J. D. Winkler, M. G. Shanley, G. A. Moody, J. C. Crowley, J. Hawes-Dawson, S. C. Moore. June 1994.

This draft describes the approach and data collection plan for the RAND Arroyo Center's assessment of prospective changes to the Total Army School System. The U.S. Army is seeking to streamline and consolidate its extensive system of schools, including institutions that serve both the active and reserve forces. The assessment covers three areas; (1) training requirements and school system production; (2) quality of training; and (3) resources and costs. The assessment requires data from

both existing systems and new sources. The new data collection will focus on commands and Reserve Component Training Institutions (RCTIs) in Region C (a prototype regional school system the Army is establishing during Fiscal Years 1994 and 1995 in the southeast region of the United States) and a comparison area, Region E (the upper Midwest states). RAND will collect the data through visits to headquarters and institutions, telephone contacts, and mailout of reporting forms and survey questionnaires. The appendices to this report document draft versions of the forms and questionnaires.

DRR-740-A FORSCOM Installation Project In-Progress Review. J. Halliday, J. H. Bigelow, J. G. Bolten, E. Keating, B. Rapaport, J. M. Sollinger. June 1994.

This draft examines eight major FORSCOM installations—Forts Bragg, Campbell, Carson, Drum, Hood, Lewis, Riley and Stewart—and provides preliminary results for four analysis areas: quality-of-life, cost, deployment, and training. Data gathered show no significant difference among installations with respect to quality of life. Existence costs for major installations are about $55 million annually, and between $10 and $20 million for subinstallations. Installations have minor differences in deployment times, but in general the differences appear to fall within the variations caused by different ship speeds. Significant differences exist among installations in terms of what type of training each can support and the amount of usable training area available. Further, two installations—Forts Bragg and Hood—contain about one-half of FORSCOM's troop population. Fort Hood can accommodate a large population but Fort Bragg, in part because of numerous environmental restrictions, is far more limited.

DRR-747-1-A Integration of NVL-2D into JANUS. C. N. Johnson, A. Stich, P. Vye, J. Marti. October 1994.

This draft documents the results of integrating the Night Vision Lab Two Dimensional (NVL-2D) target acquisition algorithm into the JANUS combat simulation. The primary processes included are: (1) experimenting with the algorithm in order to understand it; (2) changing JANUS data structures and target acquisition methods; (3) verifying JANUS output with the ACQUIRE model; and (4) verifying JANUS with code walkthroughs and manual checking. The authors conclude that: (1) the NVL-2D is more optimistic than the original JANUS model for detection; and (2) the algorithm and supporting data structures were integrated properly into JANUS. However, there is still a question about the algorithm effects at less than 700 meters where the results differ. Also, to use the algorithm effectively, JANUS will require an expanded database of sensor effects and vehicle dimensions.

DRR-750-A Comanche Gun-Option Study. K. B. Amer. July 1994.

This draft describes a method for analyzing helicopter air-to-air combat data, in general, and specifically for the RAH-66 Comanche Helicopter. The approach to the study analyzed the results of the air-to-air combat tests conducted at Patuxant River some years ago. The results of the study indicated that although the gun turret on the Comanche adds a little over one percent to the weight and cost of the Comanche, these penalties are justified by a threefold increase in firing opportunities. In addition, the study indicated the value of an emergency power rating for the Comanche in improving the rate of climb, which is of great value in air-to-air combat. Another result of the study established the high rate of change of viewing angle to the adversary (up to 40 degrees per second) leading to great difficulty in "locking on" the adversary. This suggests the value of adding video processing to automate and speed up the lock on.

DRR-755-A The Cuban Military and Cuba's Future. E. Gonzalez. June 1994.

This draft examines the role of the Cuban military in post-Castro Cuba, particularly the Revolutionary Armed Forces (FAR). The draft argues that in the short term (over the next year), the FAR is likely to remain loyal, particularly if the regime's internal security apparatus can continue to control the populace; but beyond the short term, the economic situation may deteriorate further and the regime could begin to lose control of the streets. In that instance, the FAR's loyalty may well be tested if Army units are deployed and asked to fire on civilians. Whatever the outcome of the current crisis, the FAR's capabilities will ensure that it remains a pivotal institution in a future Cuba, but one that will probably pose problems for Cuba and the United States because of its anti-democratic and anti-American value system. Thus, the United States should initiate some confidence-building measures and assurances to begin altering some of the FAR's preconceptions and values, with the aim of laying the groundwork for improved future relations with the Cuban military.

DRR-758-1-A Army Culture and Planning in a Time of Great Change. J. A. Dewar, D. S. August, C. H. Builder, R. E. Darilek, S. Ducksworth, W. M. Hix, B. Nichiporuk. September 1996.

This draft investigates the Army's organizational culture and its potential for impeding sound planning in the post-Cold War world. Organizational culture affects planning positively and negatively, but in times of great organizational change there is particular danger that it will spur maladaptive changes. We explore that danger through a framework developed to identify potential cultural planning impediments (PCPIs). The framework is derived from the literature on organizational culture in private industry and adapted to the special situation of the military services. That framework is then applied to the Army of today and four tiers of PCPIs are identified. It is in the nature of the framework that the PCPIs remain potential impediments pending review by the Army. The six PCPIs in the top tier are recommended for careful review. In addition, we discuss general steps that can be taken to avoid or mitigate cultural planning impediments.

DRR-778-A Ammunition Support in Operation Restore Hope. K. J. Girardini, D. Oaks. July 1994.

This draft documents a case study of Operation Restore Hope (ORH). The purpose of this draft is to use empirical evidence and data to evaluate current munition distribution processes in light of the demands of force projection. Several issues are raised in the draft. First, the current policy of a single definition of ABL does not reflect the spectrum of missions faced by combat units. Second, deliveries by the APS were delayed by port limitations and high sea states suggesting the APS should not be thought of as a guaranteed source of early munition sustainment. Third, munitions sustainment in Somalia was accomplished primarily by airlift reducing the logistical "tail" required in Somalia. Simplifications of the airlift process could further improve responsiveness. Finally, poor information flows continue to plague the system particularly across organizational boundaries. Slow information transfers by batch-cycle information systems require off-line information flows that invariably result in loss of asset visibility. These problems with source data capture must be addressed to achieve full benefit of total asset visibility (TAV) initiatives.

DRR-786-A A Training Model to Determine Post-Mobilization Training Resource Requirements. T. Lippiatt, J. Crowley. July 1994.

This draft describes a logic and series of tasks for determining the resources required for a post-mobilization training model for Reserve Component (RC) brigades. It presents an example of the first step of that approach, an unconstrained post-mobilization training model that will serve as a tool to determine required resources and illustrate the effect on resources of changes in assumptions or other variables. The unconstrained model was developed for an Army National Guard heavy brigade containing one armor and two mechanized infantry battalions and supporting units. It describes a series of training events needed to prepare the brigade for deployment. The authors developed the model from a zero base rather than focusing on a specific post-mobilization period. To do so, the authors made a number of assumptions about the Army's personnel and equipment systems, the unit to be trained, and sources of support personnel. The model describes a 102-day post-mobilization preparation and training period. Although unconstrained, the model rests on a number of assumptions that, while reasonable, are optimistic and do not leave much margin to solve unanticipated problems.

DRR-797-A Allocating the Army's Medical Resources: A Method for Sizing Army Hospitals and CHAMPUS. B. E. Lachman, E. M. Pint, J. M. Hanley, S. D. Hosek, J. R. Chiesa. July 1994.

This draft describes the analytic framework and data sources being used to determine the most cost-effective allocation of future Army health care resources between military facilities and civilian-provided treatment. The central analytic tool is a mixed binary programming model, i.e., a linear programming model with some variables that take values over a continuous range (e.g., cost, workload) and one dichotomous variable (whether an MTF is open or closed). In minimizing costs, the model must meet several constraints—e.g., CHAMPUS must meet whatever demand the military facilities do not; resource levels cannot drop below certain thresholds if treatment services are to continue operating. In allowing for shifts in resources between military facilities and CHAMPUS, the model takes into account changes in demand for care from the two sources combined, as beneficiaries alter their behavior in response to different and out-of-pocket costs.

DRR-799-A Army Medical Support for Operations Other Than War: Financing and Impact on Peacetime Care. L. M. Davis, M. Tate. July 1994.

Operations other than war represents an expanding class of missions for the Army Medical Department (AMEDD). These unprogrammed operations divert funds from other purposes and have the potential to affect both medical readiness and health care delivery to the Army's beneficiary populations. Reimbursement from the UN and from coalition countries can be slow and may not fully cover medical expenses incurred. We examined the AMEDD's share of costs for recent operations within Somalia and the former Yugoslavia to determine impact on peacetime care. Major expenses were for medical supplies, subcontracts for care, and travel. Although the costs of these operations are relatively small, their effect on peacetime care can be substantial if concentrated in a few facilities. Overall, the AMEDD was successful in maintaining peacetime care within CONUS. In Europe, the impact of the United Nations Protection Force (UNPROFOR) operation on beneficiary care is difficult to determine due to the recent drawdown.

DRR-813-1-A Integration of JANUS to BDS-D: Making Detection Consistent. A. L. Zobrist. September 1994.

This draft compares the terrain representation and line-of-sight/probability of line-of-sight, (LOS/PLOS) algorithms for JANUS 4.0 and ModSAF (an Army combat model) and gives recommendations for using the two models in the distributed interactive simulation (DIS) environment.

DRR-815-A JLINK Integrating JANUS and BDS-D Project Review. J. Marti. August 1994.

Provides an overview of the JANUS-BDS-D link (JLINK) project whose goal is to interface JANUS 4.0 to battlefield distributed simulation - developmental (BSD). The JLINK project has four primary objectives: (1) to connect the Army-accredited constructive simulation model JANUS 4.0 into the distributed interactive simulation (DIS) world; (2) to incorporate higher-resolution algorithms for target acquisition, probability of hit, and probability of kill into JANUS; (1) to support the verification, validation, and accredidation (VV&A) of the linked simulation; and (4) to conduct analyses of anti-

armor systems. The document also provides an overview of the project's components and its status and introduces the day's demonstrations.

DRR-816-A JANUS Connection to the World Modeler. J. Marti. August 1994.

This draft provides details of the JANUS connection to the Naval Postgraduate School's World Modeler program, a component of the Janus-BDS link project (JLINK). The JLINK project is described aboved under DRR-815-A.

DRR-817-A Verification and Validation JANUS - World Modeler Approach. J. Marti. August 1994.

This draft describes the Verification and Validation (V&V) strategies and results for the JANUS-Battlefield Distributed Simulation-Developmental Link (JLINK) project. It includes details of the V&V connection between JANUS 4.0, the Naval Postgraduate School's World Modeler Program, and the distributed interactive simulation protocol version 2.0.3 (DIS 2.0.3). The JLINK project is described aboved under DRR-815-A.

DRR-832-OSD/A Rapid Force Projection Technologies: In-Process Review. R. Steeb, J. Matsumura, T. Covington, K. Brendley, T. Herbert, Sc. Eisenhard, D. Norton. October 1994.

This draft presents interim results and findings generated during the last six months on the Rapid Force Projection Technologies (RFPT) project. The basic goal of the effort is to aid in the formulation and prioritization of the concepts pursued by RFPI. The study used an integrated set of high-resolution simulations to perform these detailed evaluations (e.g., CAGIS, RJARS, MADAM, RTAM, and JANUS). The systems and technologies examined included but were not limited to: (1) EFOG-M—15-km enhanced fiber-optic guided missile (six missiles are mounted on a HMMWV launcher); (2) Hunter—reduced-signature scout vehicle with elevated sensor mast and ability to designate target, and (3) WAM—(wide area mine)—smart mine that can attack armored vehicle from a distance. The authors found that (1) EFOG-M emerged as the most lethal of the weapons systems; (2) Hunter, although the most vulnerable, was the most effective surveillance asset; and (3) WAM tended to be supportive of the other systems, adding kills and shaping the battle.

DRR(L)-834-1-A The Emerging Russian Military R&D Base: Insights from the St. Petersburg Regional Case Study. C. M. Levy, A. J. Aldrin. September 1994.

This draft examines the long-term issue of Russian potential to develop a military-industrial base capable of producing and exporting state-of-the art weaponry. The draft focuses on the regional case study conducted in St. Petersburg to determine current and future directions of critical military R&D enterprises in the areas of personnel, funding, research agenda, and management. Preliminary observations include: (1) that many industrial ministry enterprises are moving away from military R&D and toward civilian production, and (2) that there is a potential void of military applied research. The authors state that without significant policy and/or market changes, the decline in military applied research will continue. The United States will want to keep a close eye on this process as it unfolds.

DRR-835-A Assessing the Conventional Proliferation Threat: Exploiting Technology on the Battlefield (U). J. Isaacson, B. Chow, P. Propper, B. Schwarz. October 1994.

The burgeoning supply of modern, relatively sophisticated military technologies makes conventional weapons proliferation potentially worrisome. This draft examines the important land combat systems likely to proliferate during the next decade and categorizes them into five main areas: (1) reconnaissance and surveillance, (2) target acquisition, (3) precision guided munitions, (4) C^3I, and (5) countermeasures. The authors point out that hardware alone does not determine military preeminence. Integrating high-technology weapons may require specialized doctrine, tactics, training, and support to ensure their military effectiveness. Moreover, organizational and cultural factors may impede innovation, thereby limiting the extent to which such weaponry is fully exploited. Recognizing that deficiencies in any one of these areas may eradicate the potential advantages of fielding leading-edge systems, the authors also present a threat-assessment methodology that goes further than conventional approaches by giving central consideration to the integration issue. Case studies of Iran, India, and China are used to illustrate the methodology.

DRR-845-A ECOMOG: A Case Study. A. Grant-Thomas, J. M. Taw. December 1994.

This draft examines the potential for U.S. military cooperation with a selected regional organization—the Economic Community of West African States (ECOWAS) Monitoring Group (ECOMOG)—and assesses how the United States and the U.S. Army can best prepare for coalition operations other than war both in the region and more generally. While it is unlikely that ECOMOG will be reconstituted for contingencies other than Liberia, the United States should not preclude the possibility of other ad hoc regional military cooperation. The authors therefore suggest that the United States continue the long-term policy of supporting the development of Africa's regional and subregional organizations' peacekeeping capabilities and to place greater emphasis on peacekeeping and other OOTW as part of the International Military Education and Training (IMET) program for key states. This approach maximizes the possibility of regional actors mobilizing coalitions independently with limited—if any—direct U.S. involvement. If the U.S. military does become directly involved, there are a number of practical operational lessons that can be gleaned by examining ECOMOG's operations in Liberia. These can be extrapolated to future coalition efforts both in western Africa and elsewhere in the developing world.

DRR-849-A Army Munitions Distribution: Shifting to Meet the Demands of Force Projection. K. J. Girardini, D. Oaks, R. Eden. October 1994.

To better meet the challenges of force projection across a broad spectrum of contingencies and missions, the Army requires improvements in major processes of munitions distribution: unit deployment with ammunition basic load (ABL), sustainment by sealift and airlift, and information transfers and decisionmaking. Recognizing that the Army has undertaken positive changes to adapt to force projection across contingencies and missions, the authors have identified four high-level opportunities for further improvements in the munitions-distribution process: (1) providing the capability to tailor ABL across missions; (2) using smaller, more frequent sealift deliveries; (3) simplifying the airlift process for faster response; and (4) improving information transfers and decisionmaking. To focus improvement efforts and to dramatically improve the performance of its munitions distribution system beyond the opportunities the authors have identified, the Army needs to establish challenging but realistic process goals in each of the three major processes (ABL, sustainment, and information). It should then create cross-functional process-action teams to identify additional process-improvement opportunities and to implement process change.

DRR-854-A/AF/OSD/RC Features of the RAND Anabel Language and Programming Environment to Support Verification and Validation (V&V). R. H. Anderson, H. E. Hall, N. Z. Shapiro. September 1994.

The authors describe a special prototype system to tangibly demonstrate advanced concepts for verification and validation (V&V) that could be adopted broadly in the DoD community and elsewhere. The system comprises a new object-oriented language called Anabel that compiles into C code, and a Macintosh-based hypertext editor. The Anabel object-oriented language is available either on UNIX or Macintosh systems; the editor is Macintosh-specific. The system is available to interested DoD agencies and contractors. Although the authors believe Anabel has many highly attractive features and could be used for a wide variety of modeling tasks, some of those reading about or experimenting with Anabel will already be wedded to other languages or environments, so they may be motivated to reimplement key ideas and capabilities.

DRR-855-A/AF/OSD/RC The Anabel Program-ming Language: Reference Manual. R. H. Anderson, H. E. Hall, N. Z. Shapiro. September 1994.

Anabel is a new object-oriented programming language and program development environment being created at RAND. It features an executable Table statement whose semantics are user-controllable, and multiple, dynamic inheritance. Appropriate use of these features allows Anabel programs to be readable by nonprogrammers familiar with the subject matter. The Anabel compiler operates on UNIX workstations or on the Macintosh within the Macintosh Programmer's Workbench (MPW). It is available to government contractors and other interested parties. A Macintosh-based hypertext documentation and editing facility is being developed that works in conjunction with the Anabel language; for details, see RAND document DRR-856-A/AF/OSD/RC, The Anabel Hypertext Editor: User's Manual. This Anabel reference manual is available as an Editor Macintosh hypertext document.

DRR-856-A/AF/OSD/RC The Anabel Hyper-text Editor: User's Manual. R. H. Anderson, N. Z. Shapiro. September 1994.

A new hypertext document editor is being developed at RAND, in conjunction with the Anabel programming language (see DRR-855-A/AF/OSD/RC, The Anabel Programming Language: Reference Manual). It allows creation of hypertext-linked documents as program documentation linked to Anabel source code, or as stand-alone hypertext documents. Hypertext links may access arbitrary text segments within the same document or in other Editor documents, other Macintosh files or applications of any type, voice annotations, or folders. The "buttons" from which these links are accessed may be inserted into a document or be "buttonized" text segments. Pictures created in another application may be inserted into Editor documents. UNIX commands may be executed from within an Editor document (via a TCP/IP link), with their I/O taken from and inserted into the current Editor document. There are richly featured Find and Replace commands. The Editor is available to government contractors and other interested parties. The User's Manual for the Editor is itself a hypertext document that uses and illustrates the Editor features.

DRR-857-A Army Civilians and Contractor Employees in Contingency Operations: Developing a Shared Vision Between Planners, Leaders, and Participants. J. Bondanella, E. Keating, W. Spencer, L. Horgan, E. Cesar. October 1994.

The U.S. Army is involved in a variety of activities that concern planning for participation of Army civilians and contractor employees in future military operations. This draft provides the Arroyo Center's findings and recommendations from research on the laws, policies, and procedures that might be needed to protect the interests of all parties while facilitating civilian participation. For interviews and other research material, the study concentrated on the Army deployment to Operation Desert Shield/Desert Storm. The Army has the authority to direct its civilian employees to deploy to potentially hostile or dangerous situations, but current policies for mobilizing emergency-essential government civilians reveal the preference of Army leaders for voluntary participation. This draft highlights government policies and practices that tend to frustrate the very volunteerism that Army

leaders hope to promote. The draft concludes with several recommendations on policy, planning, training, and operations; it suggests that a shared vision among military planners, commanders, Army civilians, and contractor employees would enhance volunteerism and participation of civilians in contingency operations.

DRR-858-A Impact of Information Technologies on Organizations: Implications for the Army. L. Joe. September 1994.

This draft examines the impact of information technologies on organizational structures and its relevance to the Army. The draft first addresses the impact of information technologies on commercial industry, especially on how organizational structures have adapted to improve operations in a changing competitive environment. The analysis reveals that the impact of information is best exploited when combined with changes in organizations and that change is best structured around the key core processes of the firm. The draft then explores the implications for the Army and provides an example of how the Army might change its organization to take advantage of information technologies, using the battle dynamics defined in TRADOC Pamphlet 525-5 as representing the Army's key core processes.

DRR-867-A A New Approach to Supporting Depot-Level Maintenance Policymaking. S. Brady, J. Dumond, R. Eden, J. R. Folkeson. September 1994.

DoD and Army leaders have recognized the need to downsize logistics capabilities appropriately as part of the ongoing drawdown of U.S. military forces. However, recent efforts by the Army to consolidate some repair depots and close others have met with resistance. Additional efforts to improve the efficiency of the industrial support operations by encouraging competition for some of the industrial-based workload among public and private organizations have met with only limited success. In order to pursue needed reforms aggressively, Army leaders need an improved capability to develop policies with strong analytic underpinnings. In addition to being effective, such policies can be readily explained and defended. This draft describes the preliminary results of efforts to develop a *decision aid* to provide such capability. The *decision aid* is based on a mathematical programming model for determining required levels and optimal allocations of manpower and facilities for maintaining various weapon systems under a variety of economic, political, and operational constraints.

DRR-872-A Radical Islam in Sudan. G. E. Fuller. September 1994.

This study is part of a series of studies the author has written on Islamic fundamentalism, or Islamism, in the Muslim world. The Bashir regime in Sudan that came to power in June 1989 is the second "Islamic fundamentalist" regime—following Iran—to come to power in the Muslim world. Sudan is also the first *Sunni* Islamist regime in the world—in contrast to the Shi'ite character of Iran's Islamic republic. In addition to the inherent interest in and policy problems posed by Sudan for the region and the rest of world, this case study responds to the broader problems of Islamism in the region—for example, problems of attaining power, establishing policies, and exploiting strengths and weaknesses. This draft focuses, then, primarily on the policy implications of the Sudan's Islamic experience and how it affects U.S. interests.

DRR-880-A Market Characteristics That Drive Dual-Use Rotorcraft Opportunities. C. Shipbaugh, K. B. Amer, R. Buenneke, D. Dreyfuss, J. Hagen, S. LaForge, G. Stiles. September 1994.

One way for the Army to stretch its acquisition budget is to exploit dual-use technology programs. A candidate for dual-use development is a rotorcraft that can meet the Army's cargo and troop-transport needs and that can also successfully enter high-volume, short-haul commercial aviation markets. This research examined the ability of rotorcraft to compete in several commercial markets, including same-day cargo, offshore oil service, and emergency medical service. Demand and cost models were used to determine the sensitivity of parameters affecting break-even operations. The authors determined that some unique markets employing small rotorcraft may either create a modest demand for new vehicles or for replacement of aging vehicles. However, dual-use does not yet emerge as a way to meet the Army's need for a near-term medium-heavy rotorcraft to replace its CH-47D. The draft recommends further examination of cost-reducing strategies—including advanced technology to reduce empty weight—that may help lower total acquisition, operation and maintenance costs.

DRR-902-A Stepping Up to the Dual-Use Technology Challenge: Preliminary Assessment. K. Horn, L. Horgan, C. Wong, H. Yee. October 1994.

The Army's mission needs complicate its implementation of the administration's dual-use policy. Although increased economic competitiveness is a common goal, the Army additionally needs to reduce costs and to maintain land warfare supremacy by keeping on the leading edge of technology. A review of the Army dual-use program finds that it consists primarily of technology-transfer devices that have been adapted to dual-use purposes. These serve the administration's goals but do little to enhance Army mission needs; they are designed to disseminate Army technology to the private sector. After suggesting a set of desirable characteristics for an improved Army dual-use program, the authors offer a matrix for demonstrating which features are present in both the existing devices and some possible alternatives. The draft concludes with preliminary thoughts on the desirable elements of an expanded dual-use program that would better serve the needs of both the administration and the Army, and then suggests implementation steps.

DRR-920-A A Survey of FORSCOM Installations. J. M. Halliday, J. H. Bigelow, J. G. Bolten, E. G. Keating, J. M. Sollinger. December 1994.

The Arroyo Center surveyed FORSCOM installations, focusing on five different perspectives: mobilization, quality of life, cost, deployment, and training. Researchers divided the 26 installations visited during the survey into two categories—major and minor—and further subdivided the minor installations into those with training areas and those without, which are labeled "urban area posts." The major installations, which house at least a division, are of central importance, and there are few discriminators among them. However, stationing patterns across these installations are not optimum. The minor posts with training areas are also important FORSCOM assets, providing good training opportunities for reserves and alleviating some of the training burden that would otherwise fall on the major installations. It is not clear that the cost of these installations is appropriately distributed between the active and reserve components. The urban posts seem to have only limited value to FORSCOM. What goes on at these posts does not seem to require an installation setting. Nor does there seem to be a consistent rationale across FORSCOM for support provided to soldiers in urban areas.

DRR-922-A Regional Coalitions and OOTW: Implications for the U.S. Army. J. M. Taw, J. E. Peters. December 1994.

Since the end of the Cold War, the United States has accelerated its military involvement in operations other than war (OOTW) such as peace operations and humanitarian assistance. However, concerns about international legitimacy, operational costs, and protracted involvement abroad have led the United States to emphasize coalition-building for such operations. This draft assesses existing regional coalitions as potential U.S. partners by drawing on evaluations of the Commonwealth of Independent States (CIS), the Economic Community of West African States Monitoring Group (ECOMOG), NATO and other European regional organizations, and the Organization of American States (OAS). Upon examination of these cases—representing the most viable organizations in each region—it is clear that these organizations cannot be relied upon to provide a solid pre-existing security structure upon which U.S. forces can plan collective OOTW. Even NATO, which has emphasized integration and interoperability for over fifty years, has broken down into coalitions of the willing and unwilling in the face of the crisis in Bosnia. The draft concludes with a summary of requirements for cooperation and suggests some implications for the Army for manning, training, structuring, equipping, and doctrine.

DRR-923-1-A Should the United States Worry About the Chinese-Iranian Security Relationship? An Annotated Briefing. J. D. Pollack. December 1994.

This draft focused on three major themes: (1) the principal factors and motivations underlying the Chinese-Iranian security relationship; (2) the major trends evident in this relationship and the potential risks they could pose to U.S. regional security interests; and (3) the policy implications for the United States and for the U.S. Army in particular. Three major findings emerged from this research. First, the present pattern of Chinese conventional arms transfers to Iran does not pose a major risk to U.S. forces or to any American security partners in the region. Second, the major implications of Chinese-Iranian security ties concern the longer-term potential of this relationship, in particular possible facilitation of Iranian efforts to develop an infrastructure for weapons of mass destruction. Third, the United States has some leverage over future Chinese decisions with respect to weapons sales and technology transfer to Third World states such as Iran, but its leverage exists only under certain conditions, and only in certain areas. The author concludes with several recommendations focused on how the United States might more effectively engage Chinese officials in areas of particular concern to U.S. security interests.

DRR-941-A Weapon Systems Sustainment Management: Strategies for Improving the Effectiveness and Efficiency of the Army Logistics System. P. Boren, J. Dumond, R. Eden, J. Folkeson. February 1995.

Weapon System Sustainment Management (WSSM) is a concept to guide the Army as it seeks to improve the performance of its logistics processes. The concept synthesizes and integrates management and technological innovations demonstrated by commercial firms and by some elements of the Department of Defense logistics system. The WSSM concept advocates strategies that promote the redesign of the Army logistics system to meet the demands of the post-Cold War era. Characterized by austere defense budgets and a power-projection Army, the new era requires a logistics system that—compared to the system that supported the forward-deployed Army of the Cold War period—is leaner, more flexible, and more responsive to a broader range of missions. The WSSM concept suggests that the logistics system can be improved through three strategies. First, focus the entire system on the support needs of the operational commander (the customer). Second, design and manage processes to be more responsive and efficient. Third, design and redesign weapon systems to be more supportable.

DRR-947-A Sudan: The First Sunni Fundamentalist State. G. E. Fuller. December 1994.

This study is one of a series by the author on Islamic fundamentalism, or Islamism, in the Muslim world. It deals with only the second Islamist regime to come into power in the Muslim world—Iran being the first—and the first Sunni regime to do so. A study of Sudan is of interest not only because of the policy problems the country poses for the region and the world, but also for the light it sheds on the broader problems of Islamism in the region: methods of attaining power, policies, and strengths and weaknesses. This draft focuses primarily on the Islamist aspect of Sudan rather than overall aspects of the country, and it is particularly interested in the policy implications of the Sudanese experience and how it affects U.S. interests.

DRR-950-A PT: A Tool for Saving and Examining PDUs. C. Burdorf. December 1994.

This draft documents the *pt* protocol data units (PDU) analysis tool developed at RAND as part of the JLINK project. JLINK is the linkup of Janus to BDS-D using distributed interactive simulation (DIS) protocols. *pt* will do the following operations: (1) read PDUs off the network and save them into a specified file in binary; (2) display the contents of the saved PDU file with or without any of a series of filters on the type, site, and/or entity associated with the PDU; (3) produce a coroner's report including loss/exchange ratio, and systems exchange ratio from analysis it does on PDUs from a run; (4) play back a simulation based on a file of PDUs it saved from an execution; (5) convert an ASCII representation of a PDU to a binary format, so it then can be sent over the network; and (6) read a binary PDU file and produce an output file that lists the amount of bytes and PDUs received over a specified interval, along with a summary.

DRR-972-A Special Operations Forces and Changing Operational Requirements. J. M. Taw, J. E. Peters. January 1995.

During the Cold War, U.S. special operations forces (SOF) served across the operational continuum as stand-alone forces and as conventional force multipliers. Nonetheless, many in the conventional military underestimated SOF's value, leading to a string of federal legislation between 1986 and 1988 intended to preserve and advance SOF infrastructure through the creation of a special operations command and funding earmarked for the special operations community. Nine years later, in the post-Cold War security environment, new political, operational, and environmental variables are influencing when and how SOF's core missions will be undertaken. Although SOF are clearly suited to the requirements of operations other than war and made valuable contributions to Operation Desert Storm, they must remain ahead of the curve by identifying—through analysis of trends and their own unique attributes and capabilities—what training, equipment, and force structure they will need to live up to the potential foreseen by Congress nearly a decade ago.

DRR-973-3-A Power Projection in the 21st Century: Forces and Concepts—Final Report. L. R. Moore. April 1996.

The Arroyo Center is helping the Early Entry, Lethality and Survivability (EELS) Battle Lab to assess concepts and forces for power projection in a range of situations that the Army may face in the future. These concepts will emphasize the new capabilities and forces envisioned by EELS studies, which have initially focused on the organization, effectiveness, supportability, and deployability of alternative early-entry forces, namely the 2K, 10K, and Middleweight concepts. The research evaluates the effectiveness of such forces in conjunction with joint and allied forces. It also explores how force effectiveness depends on such scenario factors as objectives, terrain, timing, enemy capabilities, and constraints on force employment. The analysis was done at the operational and theater levels.

DRR-975-A Army and Marine Force Budget Comparisons (U). D. Kassing. January 1995. SECRET

(U) Although DoD budgets are often used to compare military services, they do not necessarily embrace the full costs of military capabilities. Some have characterized the USMC's budget as relatively small, but it is also true that the Marine Corps receives substantial support from the "blue dollar" appropriations of the Navy. This support should properly be counted as part of the USMC budget, regardless of how it is categorized in Navy Department accounting. This draft compares the total USMC budget with the Army budget on the basis of budgeted spending per active-duty person. It examines, over a six-year period, all the major Navy programs that provide support to the USMC and estimates their contributions. The draft first identifies the main sources of difference in the budget costs per individual for the Army and USMC; these have to do primarily with equipment-related costs, which are not represented in the USMC budget. The author then incorporates supporting funding to estimate more accurately the per-person cost for a soldier and for a marine, finding little difference. Finally, the author compares the peacetime costs for each service of transporting its forces to regional contingencies, finding a larger cost per person to prepare and deploy a marine.

DRR-981-A The Need to Measure Repair Cycle Time: Performance Measurement in the Army's Velocity Management Initiative. M. L. Robbins. February 1995.

The Arroyo Center has been working with the Army on the velocity management initiative, which seeks streamlining of logistics processes to make them faster, more predictable, and more efficient. This draft gives a brief introduction to and illustration of some of the issues involved in performance measurement, focusing on one of the performance measures selected by the senior logistics coalition overseeing velocity management. It defines and discusses how to measure repair cycle time, using examples drawn from Army aviation systems, specifically the Apache helicopter's Target Acquisition and Designation Sight/Pilot Night Vision Sensor (TADS/PNVS) and helicopter engines. Among the major conclusions of this study are that performance measures must be configured to capture the entire process (beginning to end), yielding point estimates as well as measures of process variability; that such measures must facilitate cross-organizational comparison (akin to "benchmarking"); and finally that performance measures must support both assessment of outcomes and diagnosis of the sources of performance. Most standard Army management information systems (STAMIS) are not configured to support all these capabilities, though they can support parts of them. This study illustrated the capabilities required for performance measurement with

the highly capable information system for Apache TADS/PNVS maintained by its contractor.

DRR-983-1-A Draft Velocity Management Pilot Implementation Plan. J. Folkeson, R. Eden, J. Dumond. June 1995.

Velocity management is an approach for improving the responsiveness and efficiency of the Army logistics system. This document presents a draft of the Pilot Implementation Plan for velocity management. The pilot will first focus on improving the materiel and information flows through logistics processes (order, ship, and repair) supporting high-value weapon systems. This focus will enable the Army to gain the quickest and highest initial payoffs. The pilot implementation will target key systems or components of a few weapon systems. These systems include the Apache TADS/PNVS mission equipment package and the T-700 series helicopter engine; the M9ACE and other key low-density items; and key components of the M1A1 and MLRS. At least five dimensions of performance will be measured: time, quality, cost, readiness, and sustainment.

DRR-993/1-A Assessing the Performance of the Army Reserve Component School System: Annotated Briefing. J. D. Winkler, M. G. Shanley, J. C. Crowley, F. A. Madison, D. Green, J. M. Polich, P. Steinberg. July 1995.

This annotated briefing provides a baseline description of the operations of the Reserve Component school system, including quantitative data on (a) training requirements and school production, (b) quality of training, and (c) resources and costs. The appendix contains additional material showing specific results comparing RC school system performance in the area of the Army's new prototype regional system (the southeastern United States, also known as "Region C") with a comparison region ("Region E," the upper midwest) on a number of the baseline measures during FY94, the implementation year for the prototype. The material in the main body of this document was presented in a briefing for the General Officer Steering Committee of the Total Army School System at TRADOC Headquarters in February 1995.

DRR-994-A Data Collection Instruments for Assessing the Performance of the Army Reserve Component School System. M. B. Yokota, J. A. Hawes-Dawson, M. G. Shanley, J. C. Crowley, J. D. Winkler, L. S. Daly. February 1995.

As a step toward developing a Total Army School System that would integrate training across active and reserve components, the Army established and has been testing a prototype regional school system in the southeastern United States during fiscal years 1994 and 1995. The Arroyo Center is conducting an assessment of the performance of the Army Reserve Component school system, including the prototype. As part of that assessment, researchers developed data collection instruments to gather baseline data—in the areas of training quality and training resources and costs—directly from Reserve Component commands, schools, instructors, and students in the prototype region and in one other region. This draft contains copies of those data collection instruments. A companion document, DRR-993-A, Assessing the Performance of the Army Reserve Component School System, contains a fuller description of the study and its results.

DRR-1008-A Planning Army Force Structures for OOTW: A Status Report. R. E. Sortor, G. Pearson. March 1995.

This draft describes a methodology for examining Army force requirements for operations other than war (OOTW) to determine how meeting those requirements might affect the Army's readiness to engage in major regional contingencies (MRCs). Because of the wide variety of operations—both combat and noncombat—encompassed by the term OOTW, the authors have aggregated related types and created a set of templates to categorically represent OOTW that might be expected to occur in the future. The force requirements expressed in the templates use data from past OOTW. The authors then describe their approach to defining unit availability, emphasizing time required to train for, deploy to, and recover from OOTW. They present a model for determining force availability, which is a function of unit availability, number of units in the force, number of units required in the OOTW, and the duration or rotation cycle for units deploying to the OOTW. Finally, they apply the methodology to show how the conduct of operation Restore Hope in Somalia affected the Army's ability to maintain an adequate number of units ready for a possible MRC.

DRR-1012-A Potential of a New Technology Rotorcraft in Two Utility Markets. J. Hagen. February 1995.

The Arroyo Center assessed the economic viability of the commercial market for a dual-use technology program of cargo/commuter rotorcraft. This draft reports preliminary results for a portion of that study. The author analyzes the potential for a new-technology rotorcraft to compete in two markets, namely emergency medical service (EMS) and crew rotation and equipment delivery for offshore oil drilling platforms. The analysis shows that in the EMS market there is a technically achievable design space in which a new rotorcraft could compete with alternative transportation modes. However, the ideal vehicle size for this market is 8 to 10 passengers, smaller than the 40-passenger vehicle of greatest interest to the Army.

DRR-1022-A Balkans Chess: Players and Strategies, An Annotated Briefing. T. S. Szayna, J. A. Kechichian, E. B. Rumer, M. Van Heuven. March 1995.

This draft examines the basic motivations behind the involvement of several countries in the wars in former Yugoslavia. Regarding the question of whether the belligerents will consider themselves indebted to the involved countries when the conflicts have ended, judging from the support so far provided, there is no indication that any of them will. Outside involvement in the wars has lessened the chances that a lasting settlement will be reached in the near future, but factors internal to the former Yugoslavia continue to be the driving forces behind the conflict. The outside involvement has complicated any potential U.S. Army peacekeeping deployment in the area. The currently existing condition of protracted ethnic conflict presents deep dangers to any introduction of peacekeeping troops.

DRR-1052-A High Performance Units for Force XXI: Interim Briefing. L. Joe, J. Grossman, D. Merrill, B. Nichiporuk. April 1995.

TRADOC asked the Arroyo Center to identify the characteristics of high-performing U.S. Army units and to draw lessons for Force XXI. This draft presents the interim results of the project, drawing on past Arroyo Center research at the National Training Center, a historical look at World War II, and a review of relevant psychological research on group dynamics in nonmilitary stressing situations. The analysis suggests that high-performing units use information better than average units do. To investigate this suggestion, advanced warfighter experiments might be used to generate specific hypotheses and collect data. The authors also recommend further examination of the role that organizational structure plays in unit performance; it may be that the interaction of multiple echelons is an important factor.

DRR-1060-A Combat Identification and Fratricide: Ground-to-Ground Engagement Decision Model and Analysis. M. Callero, C. T. Veit. April 1995.

The Arroyo Center studied the engagement decisionmaking process used by U.S. Army soldiers commanding or serving as gunners in the M-1 Abrams tank and in the M-2 and M-3 Bradley fighting vehicles. The research addressed ground-to-ground engagements, and its primary aim was to assist Army fratricide-prevention efforts by providing a firing-decisionmaking basis for assessing the effectiveness of fratricide-prevention technology and concepts. The draft describes the advanced subjective measurement methods used to develop models of firing decisionmaking, discusses the models and their findings, and provides general observations and insights resulting from the research.

DRR-1075-A Russia, PFP and NATO Expansion. E. B. Rumer. May 1995.

Russia is firmly against NATO's expansion into Eastern Europe. This draft examines Russian attitudes toward the proposed expansion of NATO and toward the Partnership for Peace program. It summarizes the political, military-strategic, economic, and historical arguments against a NATO eastward move put forth by a broad range of Russian spokesmen. The author concludes with a discussion of likely Russian reactions to any expansion initiative.

DRR-1078-A Using Collaboration to Manage the Development of Advanced Technology: Interim Findings. K. Horn, I. Chang, L. Horgan, C. Wong, H. Yee. May 1995.

The Army is experimenting with some new ways of conducting business with industry. This draft documents interim findings on one promising approach: using R&D collaboration with industry to manage the development of advanced technology. The Arroyo Center identified significant opportunities for Army collaboration with industry; some of the technologies in this area are artificial intelligence, electronics, automotive, medical, and modeling and simulations, among others. Recent changes in the U.S. Code have opened up new options to take advantage of these opportunities. To best exploit these opportunities, the Army should use a combination of existing and new options. The proposed strategy is to (1) focus on Cooperative Research and Development Agreements (CRDAs) for selected high-potential technologies, both at the Army Research Lab and the Research, Development, and Engineering Centers (RDECs); (2) extend the Federated Laboratory concept; and (3) exploit the commercial-sector financial practices now permitted under new law, including capital accounts, return on investment, and revolving funds.

DRR-1083-1-A Reengineering the Army's Order and Ship Processes. J. Dumond, R. Eden, J. Folkeson, G. Harrold, K. Horton, A. Lackey, A. Lopez, G. Marullo, R. O'Connor, D. Parker. June 1995.

Velocity management is an approach for improving the responsiveness and efficiency of the Army logistics system. The approach seeks to improve dramatically the speed and accuracy of logistics processes, thus reducing the need for massive logistics resources. This briefing focuses on the application of velocity management to the Army's order and ship processes. An O&S Process Improvement Team (PIT) was established, made up of representatives from pertinent organizations across the Army. The PIT demonstrated the use of a methodology for systematically reengineering logistics processes. The PIT analyzed data that corroborated the widespread perception that O&S processes of the Army currently perform slowly and unreliably and fail to meet UMMIPS standards. The PIT established challenging new goals that exceeded UMMIPS standards. It developed reengineered processes designed to achieve the new goals, and it specified needed policy and software changes. Implementation of the reengineered O&S processes will yield immediate benefits in both effectiveness and efficiency. The PIT recommended an aggressive rolling

implementation of the reengineered processes at four sites, to begin in the summer of 1995.

DRR-1085-A Measuring Order and Ship Time for Requisitions Filled by Wholesale Supply. K.Girardini, W. Lewis, E. Gardner. July 1995.

The Arroyo Center has been working with the Army on the Velocity Management initiative, a wide-ranging effort to improve logistics processes. A critical part of the Velocity Management methodology is performance measurement. This draft reports on an analysis of measurements of the order and ship time for CONUS requisitions filled from wholesale supply. The authors investigate the response time metric for the order and ship process by analyzing three large extracts from the Army Logistics Intelligence File. The data analysis provides a snapshot of the performance of the order and ship process, which was found to be both slow and highly variable.

DRR-1095-A RSOI Issues and Analyses: Preliminary Findings. D. Kassing, J. Gebman, R. Stanton, W. O'Malley. August 1995.

Although reception, staging, onward movement, and integration (RSOI) are the final stages of strategic deployment, they have not been addressed in the Army Strategic Mobility Plan. RSOI is a joint operation, but the Army must be prepared to provide RSOI services for its own and other services' forces. This draft proposes an approach to RSOI that has four parts: doctrine, force structure, training, and information management. Much of the present Army doctrine for RSOI was written in the 1980s and needs to be updated. Interim results from an ongoing analysis of force structure for RSOI show that RSOI provider units should be among the early deployers. The analysis also shows that the Army Prepositioned Afloat (AWR 3) program will supply most of the needed RSOI provider unit equipment. RSOI training should be designed to train combat unit leaders and RSOI logisticians jointly and to reflect all modes of strategic deployment. Finally, force tracking is an essential part of RSOI. Attention should be given to the use of asset visibility systems in the theater to provide real-time force tracking to theater commanders, deploying units, and RSOI managers.

DRR-1100-A Russia's Economic Status and Outlook: 1995-1997. J. E. Tedstrom. June 1995.

In recent years, economic and political pressures have been taking their toll on Russian domestic and foreign policy. Russia's future and the likelihood of its emerging as a reliable partner in international affairs are far from certain. This draft examines the current status of and outlook for Russia's economy, with emphasis on issues that affect its military capabilities and security relationship with the United States. The study is based on primary statistical data, Russian and Western economic analyses, and interviews with prominent Russian economists and policymakers. Its conclusions cover the outlook for Russian industrial output, the chances for new outbreaks of inflation, the prospects for CIS, likely defense budget trends, the role of arms exports, and the possibilities for defense industry conversion.

DRR-1138-A Reconnaissance and Surveillance Support to the Maneuver Commander: Role of Comanche. L. Joe. July 1995.

This briefing describes the role of the Comanche in providing reconnaissance and surveillance support to the maneuver commander, specifically in terms of how it complements the capabilities of other reconnaissance and surveillance systems and how it is unique. The primary factors distinguishing Comanche from other systems are (1) it is available to tactical commanders when other systems may be tasked elsewhere, (2) it operates within the tactical commander's planning cycles, and (3) it provides high-resolution data that is focused around operational plans.

DRR-1142-A ROTC Scholarship Policy: A Preliminary Analysis. C. A. Goldman, M. Mattock, L. McDonald, A. Stone. July 1995.

The Army has developed a new scholarship program for college students enrolled in the Reserve Officer Training Corps (ROTC), which is the Army's primary source of commissioned officers. Designed to meet goals for the number of commissions while staying within a constant budget, the program offers more scholarships but with reduced value. In the past, Army scholarships paid full tuition up to $8,000 or 80 percent of tuition. The new program provides three "tiers" of scholarships ranging from $5,000 to $12,000 for tuition. Preliminary results indicate that the new program may be able to generate the desired number of commissions. However, in the face of rising tuition costs, the new scholarships may be harder to market, particularly since the Army is reducing the size of its ROTC "cadre" located at colleges. For example, tiering leaves half or more of student costs uncovered, even at lower-cost public schools. At higher-cost private schools, which include many of the country's most prestigious institutions, the lowest-value scholarships cover less than one-fourth of a student's costs. This could cause students who desire an ROTC commission to migrate to lower-cost schools, which could affect the viability of some ROTC programs and potentially affect officer quality. In addition, the new program may not attract high-ability students, who may reject the new tiered scholarships because they have other financing options. The problem is compounded because the Army competes with the other military services, whose ROTC programs offer more generous scholarships. These preliminary indications suggest the need for thorough monitoring and assessment of the new program, along with modeling of student choices and projections of quality and quantity of future cadets.

DRR-1161/1-A Assignment Stability: An In-Progress Report. W.M. Hix, J. Hanley, D. Kaplan, J. Kawata, G. Marshall, H. Shukiar, P. Stan. October 1995

The Army recognizes that stability and continuity in personnel assignments contribute importantly to unit cohesion and force readiness. Turbulence–the opposite of stability–manifests itself in three ways: permanent changes of station ("PCS moves"), local changes in duty assignments, and temporary duty away from home station due to operational or training requirements. This briefing describes ongoing RAND research to determine the extent, sources, and effects of current and future personnel turbulence, focusing on PCS moves. It shows, first, that the Army expects future turbulence to be at about the same level as it was during the Cold War—at least as measured by aggregate PCS moves per capita—and, second, that two policies within the control of the Army, career length and tour length, offer only very limited ways to reduce turbulence and to save money. A third policy, reducing overseas stationing, could have a much greater effect, but it lies outside the Army's control. Nevertheless, the Army can influence that decision; and should cost become the dominant consideration, reducing overseas stationing would be an important way to save several hundred million dollars a year. Finally, officers change jobs quite rapidly; for example, officers in key staff positions within units exercising at the National Training Center often come to the NTC with only a few months' experience in their jobs. Such job turbulence may have large effects on individual and collective performance, which Army policies do not explicitly consider; in fact, many policies increase job changes in order to achieve other goals. The draft recommends further analysis and policy attention to this type of job turbulence.

DRR-1164-1-A Improving the Army's Repair Process: Presentation to the Velocity Group. M. Robbins, J. Dumond, R. Eden, J. Folkeson. November 1995.

The authors present an overview of the early efforts of the Velocity Management Repair Cycle Process Improvement Team (RCPIT), headed by the Assistant Director of Maintenance Management, Directorate for Supply and Maintenance, Office of the Deputy Chief of Staff for Logistics. The briefing demonstrates the application of the Velocity Management process improvement methodology to the repair cycle process. It proposes a comprehensive definition of repair cycle (from motor pool to depot to ready-for-issue) for both end items and components, focusing on the example of aviation repair. The briefing discusses the difficulty of measuring repair cycle time, due to the need to capture and integrate data from multiple echelons, locations, and information systems. Initial analysis of recent data for aviation systems suggests that the performance of the repair cycle is currently too slow and variable. The briefing identifies some drivers of poor performance and provides interim recommendations for improving responsiveness, enhancing quality, reducing fallow inventories, and saving money, both at the O&MA and DBOF levels.

DRR-1175-A/OSD Recent Recruiting Trends and Their Implications: Interim Report. B. R. Orvis, N. Sastry, L. McDonald. August 1995.

This report describes recruiting trends through early 1995, focusing on changes in youth enlistment propensity and the Army's ability to "convert" the potential supply of recruits into actual enlistments. Using updated survey data and methods of analyzing propensity, it concludes that the potential supply of recruits remains higher in FY95 than it was during 1989, when recruiting results were good. However, the latest survey results indicate some downturn in youth interest in military service. When that downturn is coupled with the large increase in accession requirements during FY96 and FY97, the ratio of supply to demand for high-quality enlistees could fall short of its predrawdown levels. Furthermore, the data show a drop in contacts between recruiters and high school students (perhaps due to cuts in numbers of recruiters, their reduced presence in high schools, or a shift in focus from current students to graduates). Taken together, these results suggest future difficulties in meeting accession goals, which should be countered by increases in recruiting resources such as advertising, educational benefits, and recruiters.

DRR-1184-A/OSD Ground Target Acquisition with Advanced Acoustic Sensors: A Preliminary Investigation. J. Pinder, G. Halverson, J. Matsumura, R. Steeb. November 1995.

Ground-emplaced acoustic sensors appear to be a growing technology area for the U.S. military. Some of the applications and corresponding systems concepts emerging in this realm include advanced overwatch sensors, onboard sensors for manned vehicles (roof- or hood-mounted), internetted unattended ground sensors, wide-area munitions, and intelligent minefields. Although there is much research that delves into the technological feasibility and characteristics of acoustic sensors, with supporting empirical data, there seems to be limited operational analyses of such technologies. This research represents a first look at the emerging operational questions associated with employing advanced acoustic sensors on the battlefield—for example, How many sensors might be necessary, and what is the quality of the information they supply?

DRR-1193-A Unfettered Buyers and Constrained Sellers or Will ISM Save the Army Money? E. M. Pint. September 1995.

The Arroyo Center studied the interactions between Integrated Sustainment Maintenance (ISM) and Army stock fund policy, which create buyer/seller relationships within the logistics system. ISM is intended to improve the efficiency of the logistics system by increasing the visibility of assets and repair capability, and concentrating repairs at regional Centers of Excellence. Two potential problems could prevent ISM from generating cost savings

for the Army. First, under Army stock fund policy, the wholesale system is required to charge higher prices than installations charge for repairs, which could cause buyers to put pressure on installations to duplicate repair capacity that already exists at the wholesale level. Second, it is not known how less-comprehensive repair standards at installations affect the frequency of repair. These problems could be addressed by setting prices to reflect the variable cost of repairing or replacing items at the wholesale level, and using serial-number tracking to determine the most cost-effective standard of repair.

DRR-1197-A Joint Implications of Force XXI: Interoperability Considerations, Final Briefing Report. E. Harris, S. Cammarata, G. Huth, L. Jamison, I. Kameny, S. Pond, P. Steinberg. September 1995.

The Arroyo Center performed a "special assistance" study to investigate the joint interoperability issues associated with Army's Force XXI and identify problems that the Army will face because of the different approaches being used by the Services. DoD has provided a number of Information Directives for the Services and Agencies to follow for developing the DoD "standards-based" Information Initiative. Each Service and Agency is responding to these directives differently, reflecting to some extent their current capabilities and the transaction costs of migrating their systems to a "standards-based" open architecture. This study had a dual focus. The authors first examined the Army's approach for responding to the DoD Directives. Then they we looked at the approaches being taken by the other Services and identified a number of serious internal inconsistencies in DoD/DISA guidance documents and significant cross-service organizational problems. All of these difficulties will slow the progress of achieving "standards-based" joint interoperability. Given this assessment, the author turned to the implementation approach for developing the Army's Information Architecture. Here they advise the Army to use a "build-a-little, test-a-little" approach for migrating the TOE Army system to compliance with the Army's Technical (Information) Architecture. In addition, the authors laid out a strategy for synchronizing the Army's Information Architecture. A joint perspective will facilitate the Army's continuing role in the broader joint community and also give it a way to examine budget, training, force posture, modernization, and doctrinal decisions in a joint interoperability context. Overall, the Army has initiated a well-thought-out, top-down approach for achieving the Information Army described in TRADOC Pam 525-5. The results of this study should broaden and enhance the Army's program and prepare Army leadership for dealing with or avoiding emerging problems with the DoD "standards-based" interoperability initiative.

DRR-1199-1-A Joint Implications for Force XXI: Doctrinal Considerations. J. E. Peters. October 1995.

Doctrinal Considerations examines the Institutional Army and the realm of advanced warfighting concepts and combat developments to determine to what degree, if any, the concepts and approaches under development within other services or the Joint Staff might impinge upon Force XXI or limit Army options for future combat developments. The study explores the Army planning, programming, budgeting and executing system, the various organizations that participate in managing Army combat developments including Louisiana Maneuvers, the Battle Labs, the semiannual commanders conferences, and similar activities to determine to what extent they promote or impede progress and break-throughs that eventuate from Force XXI. The project concludes with recommendations to improve the Institutional Army and remove impediments that limit the Army's strategic agility.

DRR-1202/1-A Water Conflict in the Middle East: The Jordan River Basin. M.E. Morris October 1995.

In the Middle East, oil is the most plentiful resource, while water is the scarcest. This scarcity has led to a history of dispute as old as Jericho and as recent as current peace negotiations between Israel and its Arab neighbors. This study looks at one facet of the Middle East water problem: the Jordan River valley. It examines the history of water conflicts, the outstanding issues, and the chances for continuing disagreements among riparians. Full-scale water wars are unlikely in the immediate future, and movements toward negotiation among the various parties hold hope for the emergence of a climate for discussion of critical issues. Many issues must be addressed, however, including those of water rights and ownership and the ecological integrity of the entire Jordan River basin. The region's history and the severity of its problems cannot be discounted, even as movement toward peace creates an atmosphere in which resolution seems at last possible.

DRR-1210-A Data Management for Command and Control: Military and Technical Issues Facing Two Different Approaches. S. Cammarata, G. Huth, I. Kameny. October 1995.

The Army's vision of future command and control will depend on the coexistence of two approaches for information management: "hierarchical" and "nonhierarchical" information processing. This draft characterizes these two contrasting approaches by highlighting the differences and identifying both military and technical issues facing each approach. Hierarchical information processing, which adheres to command structure hierarchies, has been the traditional way of collecting and disseminating information. Nonhierarchical information processing is characterized by information associated with functional services or activities such as logistics, intelligence, and combat support. The first goal of this study is to recognize key characteristics and distinctions of the two approaches. The second objective is to identify pending issues facing command and control information management in the future. The comparison is focused along five dimensions of database management: (1) content of the data managed by each approach, (2)

structure and representational formalisms used for storing the data, (3) acquisition of data to populate the different repositories, (4) methods of accessing the data, and (5) means of transmitting or communicating data in each approach.

DRR(L)-1216-A A Look at How ARPA and DOE Approach Foreign Access. C. Wong. October 1995.

The Army is interested in new ways to accomplish its research and development objectives. Collaboration is a possible approach, and one element of this approach could be Army collaboration with foreign entities to achieve research goals. This draft presents an annotated briefing describing how the Advanced Research Projects Agency (ARPA) and the Department of Energy (DoE) approach foreign access to technologies developed under contracts they administer. By exploring each approach in detail, this briefing gives the Army a preview of what collaboration with foreign entities might entail.

DRR-1220-A Stockage Policy Performance Measurement: An Annotated Briefing. J. B. Abell, L. W. Miller. September 1995.

This draft describes work undertaken on behalf of the Stockage Determination Process Improvement Team in support of the Velocity Management initiative, and documents a RAND briefing given to the Stockage Requirements Computation/Authorization Group at Aberdeen Proving Grounds on September 22, 1995. It suggests three measures of stockage policy and supply system performance in addition to those the Army already uses: (a) weapon system availability computed from observed shortage days, (b) perfect order achievement rate, and (c) total and standard inventory investment costs. Standard inventory investment cost is defined as the total inventory investment cost, computed by an optimization model such as OSRAP, required to deliver a specified level of weapon system availability. The draft is a preliminary report of work in progress, and will be followed by a more complete and formal report on stockage policy performance metrics.

DRR-1225-1-A Characteristics of High Performance Units: Implications for Force XXI. L. Joe, J. Grossman, D. Merrill, B. Nichiporuk. January 1996.

To gain insight into the future of Force XXI, the Army is interested in identifying characteristics of high-performing combat units. The Arroyo Center drew on its longstanding research effort at the National Training Center to find information about high-performing units in that (admittedly constrained) environment. It also delved into the historical record, specifically the U.S. Army's 1944 campaign in northwest Europe. That example provided an opportunity to look at large units operating in a long, complex campaign. The researchers also investigated the psychology literature for evidence of high-performance traits in other demanding tasks of group dynamics, such as air traffic control centers or surgical teams. To compare and extend the results of these three looks at high performance, the authors developed a framework for describing information processing, using it to identify areas for investigation during Advanced Warfighting Experiments for Force XXI. The researchers confirm that high-performance units do exist, and that one distinguishing characteristic is their effective use of information.

DRR-1231-A Army Special Operations Forces in the Post-Cold War Era. J. M. Taw, J. E. Peters. September 1995.

In the post–Cold War security environment, how salient are the traditional missions of special forces, civil affairs, and psychological operations units? This study draws heavily on Army Special Operations Forces (ARSOF) training and deployment data to establish current employment practices, it examines combat developments expected to make the general-purpose forces more capable, and it surveys global trends in arms proliferation, population migration, urbanization, and similar factors likely to define the environment in which ARSOF will operate. From these three lines of investigation, the study reaches conclusions about the salience, adequacy, and sufficiency of ARSOF training, overall skills, and preparedness for the challenges of the current era.

DRR(L)-1244-A Performing Collaboration to Manage the Development of Advanced Technology. K. P. Horn. October 1995.

This draft presents the results of ongoing research on using collaboration with industry to manage the development of advanced technology, focusing specifically on the opportunities that exist for collaboration with nontraditional military suppliers (NTMSs) and on what it would take to attract more NTMSs to do business with the Army. We find that significant opportunities exist for Army collaborations with NTMSs, but that the Army has had limited success attracting NTMSs using traditional options—e.g., contracts, Cooperative Research and Development Agreements (CRDAs), and Patent Licensing Agreements (PLAs). New contractual options for collaboration—in particular, Other Transactions—are promising because they eliminate many cumbersome regulations, but the Army must also understand and identify the relevance of the Army's research in terms of the commercial markets. Finally, we find there are three things the Army can do that would significantly help improve its chances of successful collaborations with NTMSs: align technology objectives, produce business plans, and plan for success.

DRR-1245-1-A Toward More Cost-Effective Army Stockage Policies: An Annotated Briefing. J. B. Abell, L. W. Miller. February 1996.

This draft contains a briefing given to an audience of senior Army officers and civilians at Fort Lee, Virginia, on 9 November 1995. It contrasts the Army's current, traditional supply stockage policies with modern, system-oriented methods. It shows a simple example of how modern methods can improve the cost-effectiveness of the Army's stockage policies, and urges the Army leadership to develop initiatives to move the Army in the direction of improved stockage policies and stockage determination methodology.

DRR-1248-A Communications and Information Systems in Support of Logistics in the Theater: A Progress Report. J. H. Bigelow, M. Y. D. Wang. November 1995.

The Army is seeking ways to use more capable comm/info systems to improve the speed, accuracy, and reliability of its major logistics processes. This briefing concentrates on describing the demand for logistics data communications in the theater, though it touches on how the demand might be met. Two measures of demand are the number of potential subscribers and the volume (MB/day) of message traffic. We have fairly good estimates of the number of potential subscribers (several hundred per division, thousands in a corps), but poor data on message volumes. It seems likely that most potential logistics subscribers handle very modest message volumes (less than 2 MB/day), and it may not be important to get better volume estimates for them. The data show, however, that a few potential subscribers handle very large volumes (more than 100 MB/day). Many potential logistics subscribers operate in a part of the theater that the Army's current communication system serves only by wireless communications. The Army's ability to serve all these additional subscribers is questionable. It appears, however, that they could be served by existing and soon-to-be commercial satellite communication systems.

DRR-1250-A Update on RAND Research on the Total Army School System. J.D. Winkler, M.G. Shanley, J.F. Schank, M.G. Mattock, R.A. Madison. November 1995.

This annotated briefing summarizes problems identified in the baseline review of the RC system's operation and updates RAND's assessment of the "Total Army School System" and the regional prototype after two year of implementation. It suggests initiatives for solving some of the more readily addressable problems. It also discusses structural problems and strategies for attacking them.

DRR(L)-1268-A Options for Countering MRL Threats: Assessment of Two Near-Term MLRS Upgrades. J. Matsumura, R. Steeb, G. Halverson, S. Eisenhard. January 1996.

This draft summarizes the first phase of research in support of the Precision/Rapid Counter Multiple Rocket Launcher Advanced Concept Technology Demonstration. (The second half of this research is documented in DRR-1425-A). The initial research thrust examines and compares in detail two possible "near-term" options for improving the U.S. Multiple Launch Rocket System (MLRS) counterfire capability: a modified submunition and a guided MLRS rocket. These two options were assessed within the context of the Joint Precision Strike Demonstration project office scenario and guidelines. Detailed simulation was performed to characterize the effectiveness of the two options in a number of different threat cases. Sensitivity analysis in the areas of MLRS targeting timelines, aimpoint selection, threat movement, and weapon activation times are key elements of this research. The authors also consider how new technologies (e.g., digitization) and threat reaction (e.g., change in tactics) might affect these two options.

DRR-1271-1-A Improving the Army's Repair Process: Baseline Repair Cycle Time Measures. M. Robbins, P. Boren, J. Simpson. May 1996.

This draft documents the results of the Arroyo Center's analysis of repair cycle time performance in support of the Velocity Management initiative. It is part of the larger effort of the Army's VM Repair Cycle Process Improvement Team to define, measure, and improve performance of the Army's repair processes. The document discusses both the methodology and the results of data analysis of the repair process. It explicates the use of multiple databases to establish baseline repair cycle time performance measures and some of the problems encountered from missing data or incompatible data systems. Most of the document is devoted to describing cycle times for four major weapon systems and a large group of components at four Army installations and several depots, both organic and contractor-operated. The document shows that process times, whether for in-shop repair or for retrograde between locations, tend to be long and highly variable. Several causes were identified: awaiting-parts problems, lack of priority in retrograde, "batching" of repairs at the depot level, and so forth. The document concludes by discussing some principles and suggestions for improving the collection and processing of repair cycle time data.

DRR-1283-1-A ROTC Scholarship Policy: Making Mission, Preserving Quality, and Controlling Cost. C. A. Goldman, M. Mattock, N. Tovar. February 1996.

The Army has been implementing both a program to offer a range of values for ROTC scholarships (called tiered scholarships) and a process for closing selected ROTC programs. This draft presents the first-year results of the tiered scholarship program, suggests a strategy to preserve that program at prestigious private schools, and offers a methodology for making decisions about which programs to close. The tiered scholarship program leaves uncovered a significant portion of the tuition at high-cost schools. As a result, most ROTC programs at high-cost schools are not attracting enough students to remain viable. The authors propose a program that covers the bulk of the costs as a

way of maintaining ROTC at selected schools. Since most prestigious school programs are private and expensive, Army ROTC will not be able to remain at more than a few prestigious colleges without the incentives that a high-value scholarship would offer. This report recommends that the Army adopt a high-value scholarship, with a cap between $17,000 and $20,000 (1996 dollars). The decline in the mission for commissioned officers means that some ROTC campus programs must close. The draft outlines a methodology for deciding which programs to preserve. It considers tradeoffs among school categories, quality measures, and cost per commission. Historical data on program cost, total commissions, minority commissions, and degree mix are useful in making the program closure decisions. However, programs that were understaffed and programs that will be significantly affected by the changes in scholarship policy require additional analysis to accurately forecast both costs and commission measures.

DRR-1286-A The Velocity Management Initiative: Implementing an Approach for Improving the Effectiveness and Efficiency of Army Logistics Processes. J. Dumond, R. Eden, J. Folkeson. February 1996.

This document annotates a slightly modified version of an executive briefing on the concept and status of Velocity Management (VM) that was presented to General Ronald H. Griffith, Vice Chief of Staff of the Army, on November 6, 1995. VM is an approach for improving the responsiveness and efficiency of the Army logistics system by systematically reengineering every logistics process (e.g., repair, order and ship, stockage determination). By improving dramatically the speed and accuracy of all logistics processes, VM is reducing the need for massive logistics resources. During the first year of implementation, the VM has been applied to the Army's order and ship processes with impressive and continuing results. Participating installations have achieved 50 percent reductions in order and ship times for orders placed against the wholesale supply system. VM is also being applied to the repair and stockage determination processes of the Army. It is intended for implementation throughout the Army logistics system and has application throughout the DoD.

DRR-1294-1-A ISM-X Preliminary Findings: Briefing to ISM Corporate Board. M. Brauner, J. Bondanella, J. Bolten, L. Galway, E. Pint. February 1996.

Logistical problems during major contingency operations coupled with the need to operate more efficiently and economically caused the Army to investigate alternative logistics concepts. One concept, developed by the Army's Strategic Logistics Agency, was called Integrated Sustainment Maintenance (ISM). The Arroyo Center was asked to evaluate the Army's expanded Integrated Sustainment Maintenance (ISM-X) demonstration. This four-part briefing describes preliminary results. It first presents statistical results on the measurement and conduct of the demonstration and in some cases compares those results to performance before the demonstration. The discussion then turns to the economic issues involved in assessing the costs and benefits of ISM and ISM's interaction with the Army's financial systems. Next, some inferences are drawn about the Army's ability to support contingency operations under an ISM-based logistics system. Finally, the authors provide cautions on ISM implementation.

DRR-1300-A Performance and Efficiency of the Total Army School System. J. Winkler, M. Shanley, J. Crowley, R. Madison, J. Schank, M. Mattock, M. Polich. February 1996.

RAND has assessed various policy options for improving the performance and efficiency of the system of schools providing individual training to members of the U.S. Army Reserve Components. This briefing presents the final results of RAND's assessment. The results indicate that in response to recent restructuring initiatives, school system performance has improved in certain areas (e.g., narrowing of the gap between requirements and the capacity to meet them, improving resource use and quality of training). Other problems remain, which can be ameliorated by changes in school system operating procedures (e.g., the underutilization of existing school capacity). However, the largest payoffs for performance and efficiency can be achieved by reducing personnel turbulence, managing school quotas better, making school staffing more responsive to changes in requirements, and (within limits) further consolidating training locations.

DRR-1304-A Evaluation of Logistics Anchor Desk's Support to Operation Joint Endeavor. D. Kassing, J. Halliday, J. Bondanella, J. Simpson. February 1996.

The Logistics Anchor Desk (LAD) is a management information system that provides access to authoritative information, contains responsive planning models, and allows collaboration among logistics staffs. It has been installed at three commands in Europe to support the planning and execution of logistics support to Operation Joint Endeavor forces in Bosnia. In January 1996, a team of RAND analysts visited the commands using the LAD to assess its early contributions. They interviewed LAD users and operators and examined records of LAD activities. The review found that the LAD has been making useful contributions to Joint Endeavor logistics. Users valued both the access to information the LAD provided and the modeling tools it made available (primarily the Knowledge Based Logistics Planning Shell). They consistently reported that the LAD was an important saver of staff time and a valued resource for interstaff collaboration and communication. However, the LAD was not able to address all questions put to it and still has some significant limitations. The analysis suggested several ways to expand LAD capabilities and overcome the limitations. Particular attention should be given to developing new decision support tools to facilitate logistics initiatives (such as velocity management and lean logistics) and to enhancing access to Joint tools and data.

DRR-1307-A Can VSATs Support Army Logistics Communications In-Theater? M. Y. D. Wang, J. H. Bigelow. February 1996.

This draft examines the potential of Very Small Aperture Terminals (VSATs), a satellite communications technology in widespread commercial use, to provide communications for Army logistics in support of a deployed force. Currently, logistics has very limited and uncertain communications in a theater of operation. VSAT technology looks attractive by comparison for a number of reasons: it can provide service worldwide; transportable terminals are commercially available; VSAT networks can serve an adequate number of users; and they accommodate a sufficiently large amount of traffic. As a talking point, an Army logistics VSAT system might consist of a VSAT terminal in each company (2,400 VSATs for two five-division corps), leased transponder capacity on three INTELSAT satellites spaced at approximately 120 degree intervals around the equator, and three permanent communication and data processing/storage hubs situated where each could see two of the satellites. A *very rough* cost estimate for this paper design includes $126 million for buying VSAT terminals and hubs, plus $14 million per year for leasing transponder capacity and operating and maintaining the VSAT network. The dominant component is the cost of terminals. We have not compared VSATs with other potential solutions to the communications problems of Army logistics, and thus we cannot make a recommendation for or against this option. But it does provide a benchmark against which to measure the cost and capabilities of those other potential solutions.

DRR-1311-A Modeling Conflict Between India and Pakistan. D. B. Fox, S. Gardiner. February 1996.

The U.S. Army War College Center for Strategic Leadership (CSL) provides a variety of educational wargames for the college curriculum and, to expand the repertoire of available scenarios, asked the Arroyo Center to develop an India-Pakistan scenario that included the potential for significant involvement of U.S. forces. The CSL also asked the Arroyo Center to implement a simulation of the India-Pakistan scenario using the Joint Integrated Contingency Model (JICM). This draft describes the scenario background. The scenario is predicated on the outbreak of hostilities between India and Pakistan in the Kashmir, where we assume that both sides have access to weapons of mass destruction and the capability to deliver them. After a brief episode of fighting, both India and Pakistan are persuaded to stop hostile actions and accept an international peacekeeping force. In our scenario, this international force is made up predominantly of U.S. light forces. After the insertion of peacekeepers, Pakistan begins to see the peacekeeping force as continuing to validate Indian claims and launches new attacks against Indian forces. These attacks, combined with the downing of a U.S. airlifter in India by a shoulder-fired SAM, cut the lines of communication to the peacekeeping forces. A major U.S. decision is how to relieve the peacekeeping force, where the alternatives include reliance on diplomacy, air power, an amphibious landing in Pakistan, or a major ground force in India. Alternatives in the simulation allow for the intervention of Iranian ground and air forces, a Pakistani nuclear attack on an Indian counterattacking force, and Iranian nuclear employment on the U.S. amphibious landing. The JICM simulation was developed in a modular fashion to allow the analyst to easily mix and match major options as well as change the timing and force levels in the scenario.

DRR-1317-A ISM-X Evaluation and Policy Implications for ISM Implementation. M. Brauner, J. Bondanella, J. Bolten, L. Galway, E. Pint, R. Eden. February 1996.

RAND evaluated the Army's expanded Integrated Sustainment Maintenance (ISM-X) demonstration and reports on the results in this three-part briefing. The first part presents statistical results on the measurement and conduct of the demonstration, and in some cases it compares those results to performance before the demonstration. The discussion then turns to the economic issues involved in assessing the costs and benefits of ISM, along with ISM's interaction with the Army's financial systems. Finally, the briefing draws some inferences about the Army's ability to support contingency operations under an ISM-based logistics system. The briefing closes with suggestions for needed changes as the Army implements ISM.

DRR-1324-A Velocity Management in Deployments: Insights from the National Training Center. M. Lewis, R. Eden, D. Oaks. February 1996.

Ongoing Arroyo Center research is using Velocity Management (VM) to improve the repair cycle process supporting the BLUFOR units at the National Training Center (NTC). The VM process improvement methodology is being used to define, measure, and improve the repair cycle as it exists during training rotations at the NTC. The performance measurements are based on data gathered in 1995 by a team of NTC Logistics Observer/Controllers. Improvements to the current process have been identified that could reduce repair cycle time dramatically, from an average of 6.4 days to 26 hours or better.

DRR-1329-A The Army's Role in Space: Strategies for Achieving Future Objectives. L. Lewis, R. A. Brown, J. Y. Schrader. May 1996.

This draft discusses the Army's role in sustaining current and obtaining new space-based capabilities. The research was requested by the Commander of the Army's Strategic and Space Defense Command (SSDC). The work identifies and assesses the critical tasks, defining future roles, and it provides strategies for ensuring the Army's access to space-based capabilities in support of the joint ground force commander. It was determined that the

Army needs to develop a well-articulated policy and consistent strategy concerning its utilization of space. To maximize the Army's ability to compete for space assets, the study identifies several different organizational schemes for SSDC and a array of investment strategies. Both sets of alternatives are designed to be low-risk and low-cost, and to improve SSDC's effectiveness in sustaining the Army's role in space.

DRR-1336-A Research, Development, and Acquisition Outlays by China's Military Services: Estimates, Conjectures, and Cautions. C. Wolf, Jr., D. Tong. March 1996.

This draft estimates the shares and dollar outlays of China's military services in 1994 for research, development, and acquisition (RDA). The estimates are based on prior RAND work documented in MR-627-OSD, "Long-Term Economic and Military Trends, 1994–2015: The United States and Asia," as well as on data derived from other sources. Acknowledging the uncertainties and arguable assumptions present in the source data and hence the estimates derived from them, as well as some puzzles raised by the conclusions, the authors estimate the Chinese military services' shares in total national outlays for RDA as follows: Army, 10.2 percent; Navy, 18.4 percent; Air Force, 23.3 percent; nuclear and strategic forces, 14.4 percent; and "other," 33.7 percent. The dollar values of these shares (in billions of 1994 purchasing-power-parity dollars) are Army, 3.95; Navy, 5.57; Air Force, 9.02; nuclear and strategic forces, 7.12, and "other," 13.04.

DRR-1353-A Reducing the Army's NCO Content: Estimated Cost Savings. B. R. Orvis, S. Way-Smith. May 1996.

The Arroyo Center conducted a special, short-term analysis to assess the cost savings that might result from a more junior Army enlisted force, in which 10 percent of the postdrawdown Army NCO strength would be shifted to grades E1-E4. The Army developed this proposal as part of its effort to consider ways to reduce MPA expenditures. The NCO grades are reduced by 1 percent of initial strength in year one and by 3 percent of initial strength in each of the next three years. Our analysis considers both the cost savings of the new structure relative to the initial force and the costs and savings accrued in the four-year transition period. Although the potential cost savings of the NCO reduction appear to be substantial, they are much smaller than the Army's initial estimate of $289 million per year. Our smaller savings range of $146 million to $169 million is due to two reasons. First, we considered the specific changes in years of service and grade distribution of the enlisted personnel inventory that would result from this policy change. Second, we considered the indirect costs associated with this change: Accession and separation costs will increase as a result of implementing this policy. Initial training costs also will increase, while NCOES training costs will be reduced. The transition costs are likely to be substantial. During this four-year period, promotions to all of the NCO grades must be slowed to produce the desired endstrength-by-grade reductions. This induces separations among NCOs who would otherwise have remained in the Army. The induced separations drive up the recruiting bill required to hold total enlisted endstrength constant at 410,700. These costs would offset the savings from the more junior force structure until the fourth year of the phase-in.

DRR-1359-A ISM-X Evaluation: Individual Item Repair Performance Measures. L. A. Galway. April 1996.

Many new Army initiatives such as Velocity Management and Force XXI are based on the assumption that information will be a key asset for armed forces of the future. Much Army logistics data, however, are widely perceived to be of poor quality. In this report, the authors review the current literature on data quality, develop a three-way scheme for classifying data-quality problems, and apply the scheme to the analysis of an important logistics data element, the End Item Code (EIC). The authors argue that the EIC has quality problems of all three types, and review the evidence and efforts of the Army to address each. The most fundamental problem is due to the deep gap between the retail organizations that create EIC data and the wholesale organizations that use it. The authors propose several strategies to bridge the gap in order to improve the quality of the EIC data. An appendix applies the data classification scheme to a number of other important logistics data elements exhibiting data-quality problems.

DRR-1403-A North East Asian Security Dialogue: Issues and Approaches. J. C. Wendt, R. E. Darilek. June 1996.

In June 1995 RAND hosted a conference that included representatives from Japan, Korea, and the United States. Conference participants believed that without predicting either event, the two biggest possible dangers facing the region as a whole in the future were the development of China into a regional hegemonic power and the potential withdrawal of the United States from the region. The two biggest management problems likely to arise are a Japan that increases its security commitments in the region, and the process of Korean unification—which raises questions about the subsequent regional role for a unified Korea. Dialogue among the countries of the region could help to address these dangers and problems. In addition to ongoing bilateral discussions, a trilateral dialogue among the three democracies of the region, developed step by step, could help address some of the problems noted above, while also providing a basis for entering into multilateral discussions.

DRR-1404-A Arms Control and Regional Security in North East Asia: Lessons Learned. R. E. Darilek, J. C. Wendt. June 1996.

This draft documents the results of a four-year project on arms control and regional security. It records the substantive insights gained and methodological lessons learned from looking back over the four years of the project. Substantively, the first portion of the project produced potential negotiating strategies that prefigured, to some extent, the path taken by governments in arriving at the current "Framework Agreement" on the ultimate disposition of North Korea's nuclear (weapons) capabilities. The second portion of the project extended its field of inquiry to the region as a whole and grappled with the implications for regional security of Korean reunification. The methodologies largely consisted of various forms of political-military games and simulations tailored to address specific issues. In one instance, a methodological breakthrough was achieved by successfully combining man-in-the-loop political-military gaming with theater-level force-on-force computer simulations in near-real time.

DRR-1425-A Options for Countering MRL Threats: MRLs and Other Alternatives (U). J. Matsumura, R. Steeb, G. Halverson, S. Eisenhard. August 1996.

This annotated briefing represents the second half of a short-timeframe Arroyo Center research effort conducted to support the Precision/Rapid Counter Multiple Rocket Launcher (MRL) Advanced Concept Technology Demonstration (ACTD). (The first half of this research is documented in DRR(L)-1268-A.) While the earlier research examined the effectiveness of two key MLRS alternatives for the ACTD, this work picks up where the previous research left off by: (1) performing more in-depth sensitivity analysis of MLRS alternatives and (2) examining other nonartillery weapon system alternatives (e.g., Tac Air and Navy delivered weapons). This annotated briefing should be of interest to technologists, policymakers, and military analysts.

DRR-1434-A Army C4I Recapitalization Study. E. Harris, E. Kamiya, J. Stucker. November 1996.

The Arroyo Center is helping the Army DCSOPS-FD establish an approach for analyzing investment strategies for the C4I elements of the Army Program Objective Memorandum (POM). The authors pursued several avenues of study to find answers to three key questions: (1) Can the Refit or Replace (R2) strategy traditionally used for combat and combat support systems be used for C4I systems? (2) How does one begin to formulate an evaluation process for C4I systems? and (3) What sort of analyses of future C4I system options would best support Army acquisition decisions? In short, the R2 strategy can be used but with modifications that reflect the unique attributes of C4I equipment. The answer to the second question includes (1) restructuring the C4I line items in the Army POM to better identify and justify new initiatives and (2) building closer coordination between C4I acquisition budgets and refit/replace strategies of their host tactical vehicles. The answer to the third question has several parts, two of which are (1) analyze the budget impacts of alternative fielding and maintenance options with a model that can quickly generate high-level comparisons of alternative options and (2) construct a model that measures the important force performance impacts of various C4I equipment deployment options. In addition to these aspects of the problem, one needs to build an iterative process into the acquisition analysis to facilitate the synthesis of particular cost-effective solutions.

DRR-1435-A Army C4I Equipment Performance Assessment Model (ACEPAM). E. Kamiya. November 1996.

This work was conducted to help the Army (DCSOPS-FD) develop Command, Control, Communication, Computer and Intelligence (C4I) equipment recapitalization strategies. Part of this effort was the development of the Army C4I Equipment Performance Assessment Model (ACEPAM), which could be used to assess C4I acquisition options and procurement policies. ACEPAM uses the total interconnectivity of all C4I links between a force's platforms to represent its military efficiency, which in turn is used to develop a measure of risk that represents the likelihood that any two platforms in the force will not have any interconnectivity during the equipment conversion period. ACEPAM was used on some generic data to test its functions and on some Army data on combat net radios to demonstrate its operations. The model is in Excel spreadsheet format and should be compatible with other Army spreadsheet tools in use for the study of C4I equipment acquisition options.

DRR-1436-A Army C4I Equipment Procurement Analysis. J. Stucker. December 1996.

In February and March 1996, the Arroyo Center performed a project for the Department of the Army, DCSOPS-FD, to help develop C4I investment strategies and to provide rationale for C4I equipment acquisition decisions. This documented briefing summarizes and documents two spreadsheet models designed to help the DCSOPS understand and justify C4I procurement requests. The first model quantifies (a) options for fielding a C4I system and (b) options for replacing its software and hardware. It then displays the time-phased cost profiles for each option. The second model investigates the phasing in and phasing out of three sequential systems. This briefing was presented to the Army sponsor on March 26, 1996, as one of two analytical approaches for analyzing Army C4I recapitalization options. See also DRR-1434-A and DRR-1435-A.

DRR-1444-A/OSD Rapid Force Projection Technologies: Assessing the Potential Countermeasures to the RFPI Force (Interim Report). J. Matsmura, R. Steeb, T. Herbert, S. Eisenhard, A. Stich. August 1996.

This annotated briefing summarizes interim research that explores the robustness of the Rapid Force Projection

Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD) systems. The preliminary findings of this work suggest that various countermeasures that a potential adversary might employ against an RFPI-equipped force can reduce the effects of, and in some cases even neutralize, the advanced fighting concept and its associated systems. To some extent, these countermeasures can themselves be countered by modifications or additions of Blue tactics and technologies. Although this work takes some critical steps toward exploring the robustness of an RFPI force, including developing a taxonomy for addressing countermeasures, more analysis is required to fully assess their potential impact on force effectiveness.

DRR-1459-A Improving the Army's Repair Process: Repair Cycle Time Goals and Performance Reporting System. M. Robbins, D. Blake, P. Boren. August 1996.

This annotated briefing provides supporting materials for the presentation of the Repair Cycle Process Improvement Team at the August 5, 1996, meeting of the Velocity Group. It explains how repair cycle time (RCT) performance goals, based on direction from the Vice Chief of Staff, were determined and shows how the Army's current performance compares to those goals. It further discusses a monthly reporting mechanism on RCTs that has since been adopted by the Army with distribution to the field commencing September 16, 1996.

DRR-1462-1-A Analysis of Digitization Fielding. L. Joe, J. Grossman. September 1996.

This study was sponsored by TRADOC to examine the problems and possible solutions that the Army will face as it operates with less digitized forces. The study discusses briefly the Army's digitization plans and how the Army Battle Command System is part of the joint effort to develop a Common Operating Environment. The study then presents and discusses an analytic framework for measuring differing levels of interoperability and discusses how interoperability can be achieved through a mix of technical, operational, and organizational means. The study then applies the framework to the example of fire support and extends the arguments to the implications of Force XXI. The study concludes that as long as organizational structures are basically compatible, technical and operational solutions can work. However, as the Army moves to Force XXI, and as it uses new operational concepts and organizations, then interoperability problems will increase and may require tradeoffs in achieving desired Force XXI capabilities. These tradeoffs should be made explicit in interoperability programs with other nations.

DRR-1464-A Joint Implications of Force XXI: Interoperability Considerations Revisited. E. Harris, G. Huth, J. Jacobs, I. Kameny, S. Pond, P. Steinberg. August 1996.

The Arroyo Center has been studying the joint implications of Force XXI. This annotated briefing reports on a continuation of a special assistance study begun in FY95 in support of DCSOPS-FD. (Results of the earlier study are presented in DRR-1197-A.) We examined the Army's approach and progress in responding to the DoD Directives for the Information Initiative. We also examined the approaches and progress being made by the other services as well as the relevant activities of DoD/DISA. During this year we have extended the earlier analysis beyond the Technical Architecture to concentrate more on the Operational and Systems Architectures in assessing the joint interoperability implications. We find that *achieving a real consensus* is critical to resolving joint interoperability problems. A consensus approach concentrates on bringing the services and agencies together to actively implement policies rather than mandating policies and then attempting to resolve differences by confrontation. Given this assessment we turned to the key problem the Army is having in developing its Information Architecture. Here we conclude that the lack of an Operational Architecture (OA) is a major problem because this situation jeopardizes the Army's investment in the Digitized Battlefield. In our earlier study we laid out a strategy for synchronization of the Army's Information Architecture that uses a joint interoperability perspective rather than a parochial view. There is broad agreement that a macro view of this process provides a means for informing internal service acquisition and migration decisions as well as balancing the interoperability levels across services by mission area. The results of this study should broaden and enhance the Army's program and prepare Army leadership for dealing with or avoiding emerging problems with DoD standards-based interoperability initiatives.

DRR-1466-5-A Incorporating Information Operations into Constructive Simulations. L. R. Moore, W. L. Perry, A. J. Rankin, B. P. Lewis, P. Vye, S. Bankes. April 1997.

The "knowledge-based warfare" revolution, enabled by rapid improvements in information technologies, presents new opportunities and challenges to the Army. To respond, the "TRADOC Information Operations CBRS Assessment with DTLOMS Focus" study noted that the Army must improve its ability to analyze, model, and simulate the effects of not just information operations (IO) but indeed the entire command, control, communications, computers, intelligence, surveillance, and reconnaissance functional spectrum. Future efforts to analyze questions about force design, about doctrine, tactics, techniques, and procedures, and about systems will require this capability. This capability will also be crucial to alternative plans and courses-of-action evaluation, mission rehearsal, and distributed training. The objective of this project is to enhance the representation of IO effects in constructive simulations to allow better analysis of their impact on combat outcomes. To this end, we first establish a conceptual framework for IO and then examine the application of improved representational techniques, increased computational capabilities, and new analytic

methodologies within that framework. The project focuses on short- and long-term needs of the analytic community to support the development of information systems and processing structures for the knowledge-based Army.

DRR-1479-A Training Requirements and Training Delivery in the Total Army School System. J. D. Winkler, J. F. Schank, M. G. Mattock, R. A. Madison, L. D. Green, P. Steinberg. August 1997.

This draft analyzes the Reserve Components school system's ability to meet training requirements for noncommissioned officers (NCOs) and for soldiers who are not duty-MOS qualified (DMOSQ), focusing on a "prototype" reorganized school system in its baseline and execution years (fiscal years 1994 and 1995) and comparing it to the system as a whole. In terms of training NCOs, requirements are large but decreasing and capacity is better able to meet demand; however, utilization of that capacity is inefficient and growing worse, leading to a slight decline in graduates. In terms of DMOSQ training, requirements are decreasing, capacity is increasing, and utilization is improved but still problematic, leading to an increase in graduates. The prototype compares favorably to the system as a whole in both of these areas. The draft recommends increased management oversight and new policies to improve the utilization of training capacity throughout the school system. It also recommends the inclusion of new personnel management policies to reduce demands on the training system; e.g., by offering incentives to reduce voluntary job turnover and attrition among DMOSQ soldiers, as much of this turbulence is shown to be driven by personnel, not force structure.

DRR-1526-A The Impact of Duty Assignments on Military Intelligence Officers' Performance at the National Training Center. J. Grossman. November 1996.

This study demonstrates the relationship between the tactical proficiency of military intelligence officers at the NTC and the types of assignments the officers have served in. The data indicate battalion and brigade S2s need significant time in tactical intelligence assignments to perform well at the NTC. Specifically, high-performing brigade S2s spent, on average, 77 months in tactical intelligence assignments before deploying to the NTC, while low-performing S2s spent only 33 months in these types of assignments. High-performing battalion S2s spent 35 months in tactical assignments, whereas the low-performing S2s had less than 12 months with tactical units. This draft concludes with a discussion of the implications for the Army in its officer assignment practices.

DRR-1533-A Designing Experiments for the Modern Heavy Division Design. T. Lucas, L. Moore, P. Vye. December 1996.

This research looks across the experiments in the Joint Venture analysis plan, examining how they inform the redesign of the heavy division. Where possible, potential experiments are identified, primarily within the constructive division design analysis, that might strengthen the analysis of the division design. After applying the Credible Uses and Assumption-based Planning methods to the division design, we find that many of the suggested experiments have been or are being done by TRAC. We do suggest a few experiments not currently planned in the Joint Venture. These fall into four basic categories: (1) perform more (structured) virtual experiments to get at the ability of corps and divisions to plan and use assets that have been moved to corps control; (2) wargame some nontraditional analysis scenarios; (3) vary more items individually in the constructive runs so that specific effects can be determined and the sensitivity of the answers to unknowns quantified; and (4) for the critical combat service support portion, consider planning a live experiment to rigorously show that the new concepts are feasible.

DRR-1535-1-A Refining the Coordinates: Organizational Flux and the Use of Geographic Information Systems for Army Land Management. D. Rubenson, R. Weissler. February 1997.

The U.S. Army manages 12 million acres of land. This land is used to conduct military training and to fulfill a number of societal obligations related to the conservation of natural and cultural resources. The Integrated Training Area Management program (ITAM) is responsible for ensuring that land management strategies fulfill the needs of the military trainer. To improve land management, the ITAM program is attempting to field Geographic Information Systems (GIS), an automated tool for analyzing geographical data that has proved useful in many land management applications. Unfortunately, the Army has tried to field GIS in the past and has had many setbacks. This draft examines the organizational obstacles to GIS use in the Army and suggests strategies for implementing a stable GIS system. It examines the role of ITAM relative to other potential Army GIS users, the potential role of Army GIS centers of expertise, and ways to achieve economies of scale in Army GIS applications. An overall Army implementation strategy is developed.

DRR-1542-A Achieving OPTEC's Vision. L. Joe, J. Grossman, T. Lucas, L. Moore. November 1996.

This draft presents the results of a special assistance study done at the request of the Commanding General of the U.S. Army Operational Test and Evaluation Command (OPTEC). The report discusses ways to achieve OPTEC's vision for the 21st century, identifying new capabilities that must be attained in technology, methodological approaches, and relationships with other organizations. The study recommends that OPTEC (1) actively

participate in integrated product teams and integrated concept teams to facilitate test and evaluation (T&E) early in the development cycle, (2) develop a process with trainers to increase the number of data sources, (3) incorporate data sources (from tests, exercises, and deployments) into an overarching evaluation plan, (4) increase participation in modeling and simulation initiatives to push for model parameters and inputs that are measurable and for models that reflect actual processes needed for T&E of systems.

DRR-1581-A Velocity Management Implementation Guide. J. Folkeson, R. Eden, J. Dumond, J. Sollinger. February 1997.

Velocity management (VM) is an approach for improving the responsiveness and efficiency of the Army logistics system. This document offers guidelines for installation personnel who are participating in the implementation of VM. It describes the VM concept, advises on establishing and staffing a Site Improvement Team (SIT), and illustrates how the team should apply the Define-Measure-Improve process improvement methodology. Worksheets are provided to help guide the SIT in using the methodology. The document also provides chief VM points of contact and appends an annotated list of recommended reading materials.

DRR-1627-A Using Activity-Based Management (ABM) to Foster Innovations in Army Individual Training. M. G. Shanley, J. C. Crowley, J. D. Winkler. April 1997.

This draft presents results of Arroyo Center research on the management of resources used for individual training in the Army. The Army seeks to foster innovations in individual training that improve readiness and efficiency. "Distance learning," made possible by significant advances in information technology, is one major option, but improving the management of resident training also plays an important part. On the basis of a review of resource management methods used in private industry and other educational settings, the authors recommend the selective and strategic application of the principles of activity-based management (ABM) to manage individual training resources in the Army. The report also demonstrates the feasibility and usefulness of this approach through application to several case studies.

DRR-1668-A/OSD Military Recruiting: Trends, Outlook, and Implications. B. R. Orvis, B. J. Asch. July 1997.

Based on indications of increased difficulty in meeting recruiting goals, in spring 1994 the Army Chief of Staff and the Deputy of Secretary of Defense asked RAND to examine recent trends in the recruiting market and to assess their implications for meeting accession requirements. An initial examination of the 1994 market concluded that the pool of interested high-quality young men was adequate to meet DoD needs. But, the system appeared to be less effective in tapping into this supply of potential enlistees. The longer-term analysis, reported here, confirms the reduced effectiveness of recruiting, and also finds that the significant increase in FY97's accessions required to sustain the postdrawdown force, coupled with a smaller decline in youth's interest in military service, translates into a possible supply shortage. The decline in recruiting productivity is most likely due to a number of factors, and, until these are addressed, meeting accession goals will require a greater level of recruiting resources or different management practices. The researchers offer two short-term actions for consideration: (1) increase recruiting resources, and (2) reduce the requirement for high-quality non-prior-service male accessions by recruiting more women, accepting more prior-service accessions, or changing the quality goals. Longer-term actions should be aimed at trying to enhance the cost-effectiveness of recruiting in the postdrawdown environment. This could include: rethinking recruiting management and the cost benefit of alternative recruit quality levels; considering more marketing strategies and enlistment options, particularly ones that would improve the military's ability to recruit persons interested in attending college; and optimizing the match between monthly accession goals and training infrastructure costs.

DRR-1682-1-A Performance and Efficiency of the Total Army School System. J. D. Winkler, M. G. Shanley, J. F. Schank, J. C. Crowley, M. G. Mattock, R. A. Madison, L. L. McDonald, L. D. Green, P. Steinberg. March 1998.

This draft summarizes the Arroyo Center's analysis of the Reserve Component (RC) school system and the prototype over two fiscal years (1995 and 1996) in the areas of training requirements and school production, training resources and costs, and training quality. While the RC system continues to have large training requirements, its ability to meet those requirements has grown; still, quota utilization continues to be a problem. Manpower resources continue to dominate costs, reinforcing the need to improve efficiency. Analysis shows that various strategies can improve efficiency from 10 to 24 percent; in addition, while consolidating annual training sites can yield efficiency, consolidating individual duty for training sites does not. Courseware continues to be the paramount training quality issue and, while instructor qualification is not a problem, finding enough qualified instructors continues to be.

DRR-1713-A Information Support for Long-Range Planning: Some Lessons from Industry. E. V. Larson, J. E. Peters. September 1997.

This report identifies lessons from the corporate world on strategic planning and how the Army's Deputy Chief of Staff for Intelligence (DCSINT) might profitably apply these lessons to support Army long-range planning customers. The study relies upon (1) an analysis of the literatures on corporate long-range planning and

information support; (2) detailed case studies of capital-intensive firms in three different manufacturing industries; and (3) an illustrative derivation of Army long-range planning information needs and alternative information support models. The principal conclusion is that the success of DCSINT's support to Army long-range planners may hinge more on the depth of its understanding of Army planners' key assumptions and decisionmaking needs than upon the specific information systems it provides to planners. The principal implication is that as it begins to support the Army's new Decision Based Planning system, DCSINT needs to ensure that it is continuously and routinely working with planners to ensure that intelligence support continues to meet their evolving needs.

DRR-1719-A Army Technology Transfer: Policy and Process. R. Howe, M. Pinto. September 1997.

The transfer of technology, either through government-to-government processes or direct commercial sales, is important to enhancing the security of our allies and their ability to operate effectively with our forces as well as helping support the U.S. industrial base. U.S. government policy, however, limits the type of technology that can be disclosed to various recipients, to protect the U.S. technology advantage and to avoid upsetting regional balances. Any disclosure not specifically authorized by current policy must be addressed by the National Disclosure Policy Committee, which decides whether an exception to policy is warranted. The services are major participants on this committee and process virtually all disclosure requests. This draft addresses the internal processes of the Army disclosure system only, in response to numerous complaints that the Army is excessively decentralized and bureaucratic in processing requests. The authors conclude that the Army can improve its operation in some areas, and they make some specific recommendations. However, the study does not support the charge of excessive bureaucracy, concluding that the fundamental cause of the complaints is the competing interests of those who market products and those who protect technology. Rapid changes in political alignments and explosive technological advance mean that while the general export policy remains unchanged, specific policy is constantly being revised. The Army must operate within the national policy and hence can do relatively little on its own to speed up the decision process.

DRR-1730-A Military Operations on Urban Terrain: An Invitation to Warfare in the 21st Century. R. Steeb, J. Matsumura, R. Glenn, J. Grossman. September 1997.

This draft summarizes research emerging from a project to help shape and support the Military Operations on Urban Terrain (MOUT) Advanced Concept Technology Demonstration (ACTD). The research tends to take on a longer-term focus than the MOUT ACTD, and is intended to be complementary by raising novel ideas, creating new concepts, and suggesting new technologies for urban warfare in the future. This work has been shared with many involved in MOUT-related research, including the MOUT ACTD program managers and MOUT training site commanders.

DRR-1734-A Rapid Force Projection Technologies: Assessing the Performance of Advanced Ground Sensors. J. Matsumura, R. Steeb, R. Bowdish, G. Halverson, M. Lees, J. Pinder. September 1997.

This draft summarizes research supporting the Rapid Force Protection Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD), with the goal of exploring new technology concepts for the ACTD. The focus of this research was on advanced distributed ground sensors—specifically the air-deliverable acoustic sensor (ADAS)—with emphasis on how such sensors might fit into the current RFPI hunter/standoff killer concept. High-resolution simulation was used to examine and quantify many of the key aspects of performance, environmental effects, and military utility.

DRR-1750-A Applying the Process Model of Ethnic Conflict: Yugoslav Retrospective Case. T. S. Szayna, M. Zanini. May 1998.

A "process" model developed by Arroyo Center researchers for anticipating the incidence of ethnic conflict is applied to the emergence of ethnically based tensions in Yugoslavia in 1986-1989. The authors tested the model by working backwards to see if using it in the 1980s could have led to greater understanding of the dynamics that caused the breakup of Yugoslavia and the consequent wars of Yugoslav succession. The authors examined the ethnic mobilization of the Serbs against the multi-ethnic federal Yugoslav structures. The study validates the process model's accuracy with respect to the breakup of Yugoslavia, in the sense that the strategic choices identified to each side were followed closely as the events unfolded in 1990-1991. Paring the large number of complex issues surrounding the Yugoslav breakup down to its critical dyad (the Serb challenge to the federal state) demonstrates that the model can be used successfully even in seemingly complex cases involving multiple actors (at least six major ethnic groups organized in a variety of ethnically and nonethnically based administrative units as well as the federal state). Of course, the specific process that led to the breakup of Yugoslavia (modeled in the document) eventually led to wars of succession (not modeled in the document) in the final stages of the country's unraveling. The study offers specific intelligence requirements that the model would have highlighted had it been used by intelligence analysts in the late 1980s. As such, the process model and this document are a contribution to the Army's methodological tools for anticipating ethnic conflict as one aspect of its strategic planning and threat assessment.

DRR-1751-A Applying the Process Model of Ethnic Conflict: Ethiopian Prospective Case. S. F. Joireman, T. S. Szayna. May 1998.

A "process" model developed by Arroyo Center researchers for anticipating the incidence of ethnic conflict is applied to the potential emergence of ethnically based tensions in Ethiopia. The purpose of applying the model to a prospective case was to provide a series of hypothetical but likely situations and determine the evolutionary paths for both the state and a mobilized ethnic group that would result in the most violence-prone confrontations. As such, the model proved useful in illustrating the "dangerous dyads" in Ethiopia. The primary situation examined is the potential ethnic mobilization of the Amhara against the Tigray-dominated Ethiopian state structures in an attempt to alter the political arrangements governing Ethiopia more in favor of the Amhara. Two secondary scenarios, focusing on the Oromo and the Somali, add further depth to the analysis. Neither the choice of Ethiopia as a case study to apply the model nor the selection of the specific ethnic groups as the foci of ethnic mobilization is meant to suggest that Ethiopia is somehow predetermined to slide into ethnic strife. Ethiopia is an interesting case for thinking about interethnic strife; the multitude of ethnic groups and the complexity of the country's interethnic relations have few parallels in the world. The study points to specific intelligence requirements that analysts tracking intra-Ethiopian developments need to follow. As such, it contributes to the Army's ability to anticipate ethnic conflict as one aspect of its strategic planning and threat assessment.

DRR-1762-1-A Replicated Databases for Command and Control: Modeling and Analysis of the ATCCIS Replication Mechanism. S. Cammarata, I. Kameny, J. Lender. April 1998.

This draft presents the results of a study sponsored by the Army's Office of the Director of Information Systems for Command, Control, Communications, and Computers. The study goal was to make recommendations to the Army on the use of the Army Tactical Command and Control Information System's (ATCCIS) selective replicated data approach to support information sharing within a tactical land-based communications scenario. ATCCIS is an international NATO program addressing the requirements for data interoperability among command and control systems, that is, automatic exchange of selective data between command and control information systems. The recommendations in this document were based on modeling and simulation of the ATCCIS Replication Mechanism (ARM) for database-to-database transfer between heterogeneous databases. This study produced the RAND ARM Demonstration System and used this prototype system to validate the data structures and processing routines specified by the ARM design, and to simulate and analyze a selected set of ARM replication scenarios.

DRR-1782-A The Army After Next: Exploring New Concepts and Technologies for the Light Battle Force. J. Matsumura, R. Steeb, T, Herbert, S. Eisenhard, J. Gordon, M. Lees, G. Halverson. December 1997.

This study provides force-on-force simulation-based analytic support to the AAN initiative and its series of wargames. The authors use high-resolution constructive simulation to explore both operational concepts and technology options for the light battle force concept associated with the AAN initiative. One of the key capabilities required of the light battle force is an ability to hide and wait for the right opportunity and then create a "virtual ambush," resulting in a shock or disintegration of the enemy. This kind of defeat, to some extent, contrasts with more traditional attrition in that it greatly compresses the time in which lethality occurs. Essentially, the concept envisions that the battle force first allows an advancing threat to penetrate, then unleashes massive simultaneous fires from afar and closer in. To accomplish this, unprecedented amounts of survivability (possibly in the form of stealth) and lethality (in the form of precision guided weapons) are required. Thus, as a starting point, the authors examine those two critical aspects of the light battle force concept via simulation and modeling.

DRR-1818-A Measuring National Power in the Post-Industrial Age. A. J. Tellis, J. L. Bially, C. Layne, M. McPherson. May 1998.

The arrival of postindustrial society has given rise to the suspicion that the traditional bases of national power have been fundamentally transformed and that the indices used to measure the relative power of nations should thus be reassessed as well. This draft offers a new conceptual framework to provide better evaluative measures of national power. The framework treats national power as a product of three realms: the "inputs"—the level of resources either available to or produced by a country; the "transformation" capacity—the external pressures facing a country, and the performance of both its governing institutions (nominally labeled the "state") and its society at large; and, finally, the "outputs"—the level and quality of a country's military power understood in terms of its operational proficiency or effectiveness. These three dimensions, taken together, describe national power. The analysis offered in the study elaborates the rationale for assessing each of these components, and it proffers ideas as to how they might be measured in tangible ways. This framework was developed especially to enable the intelligence community to closely scrutinize a few significant powers in the international system, one at a time.

DRR-1818/1-A Measuring National Power in the Post-Industrial Age: Appendix A—Analyst's Handbook. A. J. Tellis, J. L. Bially, C. Layne, M. McPherson, J. Sollinger. October 1998.

This handbook is designed to complement the main report (DRR-1818-A). It is intended to provide the analyst the substance of the concepts and metrics for assessing national power without presenting extensive background or the analytic underpinning contained in the main document.

DRR-1835-A Evaluating Alternative Systems Architectures. W. Perry, A. J. Rankin, L. R. Moore, T. Lucas. March 1998.

This draft reports on an application of a methodology to assess the effectiveness of alternative system architectures. The methodology consists of the application of an analytic framework to a military systems architecture design problem. The framework calls for the generation and evaluation of several alternative systems architectures. The network simulator OPNET is used to model the communication system, and exploratory analysis is used to evaluate the set of possible outcomes from successive runs of the model. The model and the subsequent analysis do not represent the definition and analysis of a real-world system. The work, however, is based on a real problem—the level of detail and the data used are fictitious. In addition, not all processes are modeled accurately. The objective is to demonstrate a proof of principle, and these simplifications make the process more understandable while not detracting from the analytic value of the work.

DRR-1838-1-A Analysis Strategy: Army National Guard Combat Training Center Rotations. T. F. Lippiatt, J. M. Polich. August 1998.

This draft describes the background and analytic approach for a project that is assessing how training at the Army's combat training centers (CTCs) is affecting the enhanced separate brigades of the Army National Guard. The National Guard has 15 brigades that receive priority for resources and are expected to maintain enhanced readiness for a possible deployment. These units have the opportunity to train at the CTCs. If every National Guard unit takes advantage of its opportunity, the enhanced separate brigades can go to a CTC once every eight years. The project will assess how these training rotations affect the unit's training, estimate the costs, assess the effect on personnel readiness, and identify and assess an expanded range of training opportunities. The project will draw data from a variety of sources, including on-site questionnaires filled out by resident observer-controllers at the CTCs, unit personnel data, evaluations from annual training, and cost data.

DRR-1856-A A Generic Model of Active Protection Systems for Military Vehicles. J. D. Pinder. August 1998.

Survivability is a crucially important characteristic of military vehicles, and it has traditionally been achieved through superior firepower and mobility, increasingly sophisticated armor, and clever tactics. During the past two decades, an additional approach to increasing vehicle survivability has emerged: an active protection system (APS) that detects and responds automatically to incoming weapons. The generic parameterized APS model described in this draft can serve as a basis for evaluating the performance, and overall utility, of alternative APS designs. The model can represent four different types of APS capabilities: (1) suites of soft-kill, (2) guided hit-to-kill interceptors, (3) fragmentation munitions, and (4) high-speed projectiles. The degree of protection provided by the APS can vary in as many as four angular sectors, and it is degraded as a vehicle experiences and survives a series of attacks. In a force-on-force simulation, such as Janus, this model can illustrate the advantages of different APS designs and configurations while also exposing potential problems. An analysis using this approach could examine the tradeoff between lightweight APS and more sophisticated armor for future vehicles in terms of survivability, weight, and other key attributes.

DRR-1867-A/OSD An Advanced Acoustic Sensor Network Model: Description and Documentation. J. D. Pinder, G. Halverson. July 1998.

Networks of advanced acoustic sensors are capable of detecting, locating, tracking, classifying, and, in some cases, identifying military ground vehicles on the battlefield. This draft describes an advanced acoustic sensor model that was developed at RAND and then integrated into a force-on-force military simulation (Janus). Key aspects of a notional acoustic sensor network designed for ground vehicle targets addressed by the model are sound source characteristics, sound propagation and attenuation, background noise, sensor performance, and target detection and location. This approach captures the impact on acoustic sensor network performance of three important factors: diurnal changes in meteorological conditions, background noise generated by multiple vehicles, and network placement and configuration. Two other RAND Arroyo Center drafts provide additional information about this model and its application: E*valuating the Military Utility of Ground-Based Acoustic Sensor Networks* (AB-169-A/OSD) discusses the research context, describes the model, and illustrates some of its capabilities; *Rapid Force Projection Technologies: Assessing the Performance of Advanced Ground Sensors* (DRR-1734-A/OSD) explores the overall contributions of acoustic sensor networks to operational military objectives. Ultimately, this work is intended to demonstrate how networks of advanced acoustic sensors can be employed by a small, robust military force while also highlighting the limitations of such networks and suggesting how they might be utilized most effectively.

DRR-1873-A Developing Warfighting Skills Among Future Army Combat Commanders. M. Leed. June 1998.

This draft outlines a plan of research into the operational experience of Army combat leaders. It explores two principal hypotheses: (1) that the operational experience of mid-level ground maneuver officers is changing, perhaps declining; and (2) that today's experiences may fail to provide a robust pool of future combat leaders. Operational experience is defined in terms of two primary components: the number of operational assignments in key leadership positions (e.g., company, battalion, or brigade commander and XO or S3 positions on battalion or brigade staff); and the key operational and training experiences that occur during those tours. The draft

describes research that is expected to trace assignment histories of current cohorts of officers, impute experience levels accrued during those assignments, compare these histories among current and past cohorts, and project the experience levels likely to be present among future officer cohorts, given a variety of assumptions about future Army structure, missions, and personnel and training policies.

DRR-1899-A Applying the Process Model of Ethnic Conflict: Saudi Arabian Prospective Case. G. E. Fuller, T. S. Szayna. July 1998.

A "process" model developed by Arroyo Center researchers for anticipating the incidence of ethnic conflict is applied to the potential emergence of ethnically based tensions in Saudi Arabia. The purpose of applying the model to a prospective case was to provide a series of hypothetical but likely situations and determine the evolutionary paths for both the state and a mobilized ethnic group that would result in the most violence-prone confrontations. The primary situation examined in this study is the potential mobilization of the Shi'a against the Saudi monarchy that controls all political life in the kingdom. The Shi'a scenario is the only one that fits the definition of ethnically based mobilization in Saudi Arabia. Analysis shows that if the Shi'a were to mobilize against the monarchy, both the state and the group would be likely to turn to violence. Neither the choice of Saudi Arabia as a case study to apply the model nor the selection of the Shi'a as the focus of ethnic mobilization is meant in any way to suggest that Saudi Arabia is somehow predetermined to slide into ethnic strife. The study points to specific intelligence requirements that analysts tracking intra-Saudi Arabian developments need to follow. As such, the research contributes to the Army's ability to anticipate ethnic conflict as one aspect of its strategic planning and threat assessment, and it contributes to the Army's understanding of the potential for conflict in the pivotal state in the Middle East.

DRR-1900-A Applying the Process Model of Ethnic Conflict: South African Retrospective Case. P. Marsh, T. S. Szayna. September 1998.

A "process" model developed by Arroyo Center researchers for anticipating the incidence of ethnic conflict is applied to the case of the end of *apartheid* and peaceful transition of power in South Africa in 1990-1994. The authors tested the model by working backwards to see if its use could have led to greater understanding of the dynamics that brought about the transition in South Africa. The study examines the mobilization of the majority black population in South Africa by the African National Congress (ANC) and this mobilized group's attempt to alter the political system in place to make it more inclusive. The work validates the accuracy of the model with respect to the South African transition, in the sense that the strategic choices identified for each side were followed closely as the events unfolded in the late 1980s. Reducing the large number of complex issues surrounding the South African transition to the critical dyad (the ANC-led challenge to the *apartheid* state) demonstrates that the model can be used successfully even in seemingly complex cases involving multiple actors (numerous state-directed ethnic/racial distinctions, intra-white and intra-black divisions, and a racially organized governmental structure). The authors offer specific intelligence requirements that the use of the model would have illustrated had it been used by intelligence analysts in the late 1980s. As such, the process model and this document are a contribution to the Army's methodological tools for anticipating ethnic conflict as one aspect of its strategic planning and threat assessment.

DRR-1917-A/OSD Joint Operations Superiority in the 21st Century: Analytic Support to the 1998 Defense Science Board. J. Matsumura, R. Steeb, R. Isensee, T. Herbert, S. Eisenhard, J. Gordon. September 1998.

This draft describes RAND research that supported the 1998 Defense Science Board (DSB) Summer Study on *Joint Operations Superiority in the 21st Century: Integrating Capabilities Underwriting Joint Vision 2010.* RAND supported the DSB through both exploratory analysis and high-resolution simulation-based analysis; this document only covers the high-resolution work, notably simulation experiments to help explore and assess Joint operational concepts. It builds on related work done by the authors for the DSB effort, Tactics and Technology for 21st Century Military Superiority (DB-198-A). The current effort draws on outcomes of other DSB studies, discussions with warfighters, and interactions with DSB members, to define a range of different Joint operational concepts that could be applied to a future (2010-2015) notional, high-intesity, quick-reaction scenario. The strengths and weaknesses of these concepts were explored using man-in-the-loop, high-resolution, stochastic constructive simulation in the context of a single basic scenario with a number of variations. The authors' intention in this work was to (1) provide insights and inputs for a broader, exploratory RAND analysis for the DSB; (2) increase dialogue among conceptualizers, users, and developers; and (3) suggest ideas to help the DSB take *JV 2010* to the next step.

DRR-1924-A Expandability of the 21st Century Army. J. A. Dewar, S. C. Bankes, S. Edwards, J. C. Wendt. November 1998.

The nonpolitical impediments to expanding today's Army are well understood. The first bottleneck is training, particularly advanced brigade- and division-level training. After there are sufficient trained brigades to man current equipment, the main impediment would become the ability of the industrial base to produce more equipment. The goals of this research were to develop a framework for studying expandability in the future and to use that framework to study how expandability issues might change. The framework centered around a simplified model of the expansion process and an exploratory modeling environment for parametrically "wandering around" among plausible futures looking for "interesting"

regions. There were few interesting regions to be found. Said another way, today's expandability issues and impediments are likely to persist in most reasonable futures.

DRR-1925-A Land-Force Dominance: Implications for U.S. Army Engagement. J. M. Taw. September 1998.

Engagement is a relatively new concept, collecting under a single rubric a set of disparate activities long undertaken by dispersed civilian and military offices for a variety of purposes. For the Army, which has long conducted those activities now considered engagement—from security assistance to political-military interactions to material-technical cooperation—the challenge is to reorganize and reconceptualize these diverse efforts into synthesized, forward-looking strategy. The concept and fact of land-force dominance (the preponderance of soldiers vice airmen and sailors worldwide, regionally, and within most countries) can be used as a tool to identify where and under what circumstances the Army is best suited to conduct engagement. In fact, land-force dominance creates opportunities in both the short and long terms. But whether the Army can act on those opportunities depends on a host of factors, including U.S. national priorities, CINC priorities, partner countries' priorities and resources, and the Army's own relatively constrained resources. Although the Army has responded to the increased national emphasis on engagement by developing a draft engagement policy and reorganizing to create an international affairs office, these efforts are insufficient. The Army will continue to be tasked with engagement missions and, moreover, can use engagement to help shape the future international security environment to enhance its own evolving capabilities and offset its potential limitations. To do so, however, will require a more concerted effort, from HQDA to the MACOMs to the component commands, to establish objectives, set priorities, organize effectively, and influence civilian and military decisionmakers so that Army resources are used as effectively and efficiently as possible for engagement.

DRR-1930-A The Economic Effects of Foreign Military Sales of Army Weapons Systems. K. McCarthy, B. Zycher. September 1998.

Sales of U.S. military equipment to foreign governments are a key element of U.S. foreign policy and the Army's engagement strategy. Decisions about which weapons systems to sell and to whom have traditionally been driven by national security and political considerations. However, recent cutbacks in procurement budgets and the reorganization of defense industries in the United States have caused Army planners to think about how foreign sales of U.S. Army weapons systems might lower the Army's costs for new weapons procurement and also boost domestic employment. This study addresses the two central questions about foreign sales of Army weapons systems: First, how large are these benefits to the Army and the economy? Second, how might these benefits change in the future? The analysis indicates that foreign sales of Army equipment have negligible effects on boosting aggregate employment and sustaining the industrial base. They can, however, significantly reduce the Army's unit procurement costs early in the production cycle through "learning economies." To realize this benefit, the Army should concentrate its sales efforts on systems that are early in the development and production cycles. Currently, however, Army policy is to postpone sales until much later in the production cycle. Thus, these results suggest that if the Army wants to increase the economic benefits it realizes from foreign military sales, it will need to rethink its current strategy toward foreign sales.

DRR-1934-1-A Velocity Management and the Revolution in Military Logistics. R.A. Eden. October 1998.

The notion of a Revolution in Military Logistics (RML) is of interest in the Army logistics community because of a widespread perception that innovative operational concepts imply that the Army will possess a future logistics system that performs substantially "faster, better, and cheaper" than the current one. Many have questioned whether such revolutionary improvements in the logistics system are feasible or affordable and, if so, how they should be accomplished. This draft argues that many of the desired characteristics of an RML can be achieved affordably in the near-term through the dramatic improvement of current processes. The argument is supported by evidence from the Army's Velocity Management initiative, which since its inception in 1995 has succeeded in achieving dramatic improvements both in the performance of key logistics processes and in the logistic community's capability to implement and institutionalize significant reform.

DRR-1936-A Using Microworld Models to Train Force XXI Logistics Management Skills: Results of a Controlled Experiment. D. G. Levy, M. W. Lewis, J. R. Bondanella, M. Baisden, E. Ettedgui. September 1998.

This draft provides the results of a controlled experiment to assess the effectiveness of using microworlds to train Army logisticians. The study, sponsored by the U.S. Army Combined Arms Support Command, was part of an effort to design new training for an emerging organization in the Army—the Theater Support Command (TSC)—which, among other things, is responsible for managing the flow of people and materiel throughout the theater of operations. We designed a three-hour training curriculum around a microworld model that represents a simplified but dynamic model of the distribution management process. The main goal of the session was to teach the learners about the consequences of their decisions over time and across the distribution management system. Participants in our microworld-based training sessions improved significantly in their ability to identify problematic patterns in a distribution network and to evaluate the impacts of those trends.

DRR-1941-A Army Data for Assessing "Tempo." R. E. Sortor, J. M. Polich. September 1998.

In 1997, U. S. Army Forces Command (FORSCOM) expressed concern over the turbulence in units caused by increasing OPTEMPO and higher PERSTEMPO and its potential impact on future unit and personnel readiness. Our initial investigation, however, showed that empirical data and analyses were lacking to assess the extent or causes of OPTEMPO and PERSTEMPO and to identify potential solutions for any ensuing problems. There are two major sources of empirical data currently collected by the Army that relate to tempo and personnel turbulence. The first source is the personnel system, which collects data in the TAPDB (Total Army Personnel Data Base) on the demographics, assignments, and deployments of Army personnel. The second source of data is the USR (Unit Status Report). In mid-1997, the Army added "DEPTEMPO" (unit deployment tempo) to the USR reporting requirements in order to measure deployment activity. Because this system is so new, at this point we can conduct only exploratory analyses of DEPTEMPO. However, after a longer period of data accumulation, we believe that DEPTEMPO, PERSTEMPO, manning information, reported special duty, and locally-collected information can be used to establish levels of unit and personnel activity and personnel status over time. The draft outlines the next phase of data analysis, which will aim at describing the level of activity in various portions of the Army as well as for the Army as a whole, identifying the major categories and causes for the activity, and exploring the potential impact of these levels on the readiness of Army units and personnel.

DRR-1950-A A Description of the Correlation of Forces and Means (COFM) Technique for Decision Making. L. R. Moore III. September 1998.

Decisionmaking and command-and-control issues dominate much of campaign analysis. At this level of warfare the problem is often not the quantity of force available but how well and when it is used. Despite the importance of this problem, we believe it remains the least understood and most inadequately modeled part of most campaign-level simulations. This draft presents an easy-to-understand approach to representing the aggregate-level decisionmaking processes of a commander when monitoring the progress of an attack and determining the allocation of forces between alternative attacks. The technique, known as the Correlation of Forces and Means (COFM), was developed extensively by the Red Army. COFM is a value-based method that relates attack frontages, forces, time, distance, and the likelihood that an attack will be successful. The U.S. Army Command and General Staff College teaches a similar approach to decisionmaking, albeit without the heavy quantitative emphasis.

DRR-1952-A A Description of Alternative Aggregate Attrition Methodologies. L. R. Moore III. September 1998.

This draft describes methods to adjudicate attrition for an aggregate, constructive simulation such as JWARS. Two aspects of attrition adjudication are considered: the actual computation of attrition and the maneuver scheme that places weapons in the battle. Many simulations emphasize the former component and pay little attention to the latter. Of the two computation methods we discuss, one relies heavily upon higher-resolution simulations to calibrate and adjust the parameters in the aggregate simulation; the other directly computes the parameters in the aggregate simulation itself. This document describes each of these methods and summarizes the advantages and disadvantages of each. Variants of each method should be examined in parallel to the JWARS development effort to achieve the necessary understanding and credibility. A direct method seems to be the best choice for the initial version of JWARS. A calibrated method may be necessary to allow JWARS to evaluate systems performance in the future. JWARS requires a well-researched, open, transparent combat attrition methodology. With respect to computation, since the support infrastructure is not available to tie the JWARS representation to high-resolution feeder simulations, we recommend a direct method that would be self-contained within JWARS. We also feel that off-line research should be performed to determine the characteristics of the JWARS representation with respect to its influence on analysis results.

DRR-1953-A A Description of Greedy Resource Allocation Methodologies. L. R. Moore III. September 1998.

Resource allocation involves the assignment of scarce resources to overwhelming demands for those resources. In addition, the allocation is evaluated according to an objective measure to determine the efficiency of the allocation. The representation of resource allocation is a key area for aggregate constructive simulations. The allocation of reserves to halt an enemy or the tasking of aircraft to missions with minimal attrition over time are two examples of resource allocation encountered in such a simulation. This draft presents a robust technique for solving the resource allocation problem that executes quickly, is easily understood, and closely approximates an optimal solution. In addition, it mimics human decisionmaking in time-constrained circumstances. The technique is called the "greedy algorithm." The greedy algorithm is an iterative myopic procedure. At each iteration, it makes one assignment of a resource that maximizes the rate of improvement of the objective evaluation. The greedy algorithm is motivated and described. Various implementation and usage considerations are also discussed. This document will interest those wishing to implement a quick, robust, straightforward resource allocation representation in an aggregate constructive simulation such as JWARS.

DRR-1954-A Determining Training Proficiency at Combat Training Centers: Data Collection Instruments. B. W. Hallmark, J. C. Crowley, H. Leonard, T. F. Lippiatt, J. Sollinger. September 1998.

Determining proficiency at individual and collective tasks has been a perpetual challenge for the Army. This draft describes an approach that will help characterize proficiency demonstrated at the Army's maneuver Combat Training Centers (CTCs) in CONUS. Over the past decade, RAND Arroyo Center has conducted several studies using data gathered from CTCs, including a recent analysis that demonstrated how to develop quantitative indices of company success in battle (RAND MR-846-A, 1997). The authors are now seeking to build upon that approach to demonstrate a broader prototype system that could provide the Army a credible mechanism for tracking proficiency over time. Key performance indicators for units from infantry platoon through brigade combat team were identified. The authors began with an extensive set of measures based on Army ARTEP-MTPs and Field Manuals. Then, in collaboration with the observer-controllers (O/Cs) at the National Training Center and Joint Readiness Training Center, they selected key indicators to form questionnaires that could be printed on small cards suitable for use in the field. In all, 29 such questionnaires were developed, one questionnaire for most organizations in the brigade combat team. These questionnaire cards are filled out by O/Cs at specific points during unit rotations at the CTCs. The questionnaires are being used at both NTC and JRTC to build a database beginning in June 1998.

DRR-1955-A A Description of the Workflow for Course of Action (COA) and Force Sufficiency Analysis. L. R. Moore III. September 1998.

This draft presents the workflow necessary to conduct course of action (COA) analysis as conducted by the theater planning staff for a Commander-In-Chief such as Central Command. First, a generic framework is presented. The framework is then applied to the specific COA task. Finally, the tools and functionality necessary for JWARS to support the planning process is described. This framework will be used to design the human computer interface for JWARS.

DRR-1958-A AAN Strategic Resource Exercise. P. Wilson, R. Molander, J. Brower, J. Gordon IV, D. Mussington. October 1998.

This study was undertaken to garner a wide range of perspectives from both the Army and the larger national security community on the challenge of conducting national military planning in the projected highly dynamic geopolitical and technological environment of the early 21st century. The authors designed, conducted, and analyzed a strategic decisionmaking exercise to help the Army identify and prepare for the emergence of one or more major military competitors in the 2008-2015 timeframe in a benign but resource-constrained environment. This draft describes that exercise and presents its results—revealing the importance of both outreach and long-term planning to the budgetary process. The study concludes that the Army is unlikely to see increases in its budget and that even if additional funds were acquired because of a major military conflict, the underfunding of near-term and next-generation programs will make it difficult for the Army to meet new challenges.

DRR-1959-A "The Day After . . ." in the Maghreb: An NBC-Shadowed Exercise. P. Wilson, R. Molander, J. Wendt, R. Mesic, S. Edwards. September 1998.

This draft reports the results of a series of exercises conducted for the U.S. Army on the implications of the proliferation of nuclear, biological, and chemical (NBC) weapons for the Army and for U.S. national security strategy and policy in the Post-Cold War world. U.S. policy seeks to prevent the further proliferation of weapons, but the overwhelming power of U.S. conventional forces will likely encourage future regional adversaries to acquire such weapons (and associated delivery capabilities) as part of an "asymmetric" response to U.S. conventional power. To highlight the potential disruption of U.S. Army operations and logistics from limited adversary NBC use, especially high-altitude electromagnetic pulse, and from limited biological or chemical weapons attacks, exercises based on a "day after" methodology were developed and conducted with a series of Army representatives.

DRR-1961-A Force XXI: Implications for Multi-Force Compatability. M. Zanini, J. M. Taw. September 1998.

Over the next decade, political and economic considerations will often cause the United States to seek coalition partners, despite its capability to act unilaterally in many circumstances. While this is nothing new, what is new is the U.S. Army's rapid modernization, relative to its allies and potential coalition partners. As part of Force XXI, the Army plans to have a digitized division by 2000, a digitized corps by the end of FY04, and the entire force digitized by 2020-2025. As the Army progresses toward these goals, it must ensure adequate compatibility between its digitized units and the rest of the Army. The objective of this study was to determine how the Army's technological developments for Force XXI will affect multi-force compatibility, and how significantly.

DRR-1983-A Measures of Effectiveness for the Information-Age Army. R. Darilek, W. Perry, J. Bracken, J. Gordon, B. Nichiporuk. March 1999.

The 1990s have witnessed the beginning of what future historians will undoubtedly call the information age. While it is clear that information will have a far-reaching effect on a host of activities—including warfare—how to quantify and measure that effect is less clear. The

understanding of how to do so is important to the Army, particularly at a time when it is spending a considerable amount of its scarce investment capital to establish information-age links across its forces—the so-called digitization of the Army. As it transforms itself, the Army needs analytic tools to help make the best choices possible. Chief among these tools are good measures of effectiveness (MOEs) that can demonstrate the value of information in terms of military outcomes. This draft reports on a small set of information-age MOEs developed in an attempt to spark the creation of many more such measures. This research demonstrates that development of MOEs is feasible, not only for combat operations but for stability operations as well.

DRR-1986-A Implementing Practice Guidelines in the Army Medical Department: A Manual for Action. D. O. Farley, E. S. Quiter, S. Cretin, L. McQueen, W. L. Richman. October 1998.

The Army Surgeon General has placed a priority on effective use of clinical practice guidelines to achieve greater consistency and cost-effectiveness in the delivery of health-case services for Army active-duty personnel, dependents, and retirees. The Army Medical Department is working to implement guidelines proactively across the Army health systems. This draft manual, designed to assist in guideline implementation, contains information, instructions, and examples for each of the major steps in implementing a practice guideline: establishing supportive conditions and an implementation structure, developing and executing an implementation plan, tools for use in creating changes in clinical processes, and monitoring and feedback on implementation progress.

DRR-1992-A Developing and Implementing Clinical Practice Guidelines in the Army Medical System: Report of Fiscal 1998 Activities. S. Cretin, S. O. Farley, E. S. Quiter, L. McQueen, M. R. Rosen. September 1998.

This draft describes the work carried out in FY98, which focused on establishing guidelines, designing a strategy for their implementation, and preparing for Army demonstrations to test guideline implementation. Having identified implementation of practice guidelines as a policy priority, the AMEDD turned to the Arroyo Center for assistance in selecting guidelines and implementing them effectively across the Army health system. With the goal of enabling the AMEDD to achieve effective guideline implementation as quickly as possible, the AMEDD leadership and RAND team agreed upon a two-step implementation strategy. First, two guidelines will be identified and implemented in small-scale demonstrations, with RAND providing technical support in the design and execution of the implementation methods. The strengths and weaknesses of the implementation strategy and methods will be evaluated. After refining implementation methods based on what was learned from the demonstrations, the AMEDD will proceed with broader, system-wide guideline implementation of multiple practice guidelines, with continuing RAND support as necessary. In the first phase of the work, the two guidelines were identified for implementation, the guidelines were adapted for use in the Army health system, and two demonstrations were designed for implementation—one for each guideline.

DRR-1993-A Constructing a Database on Training Activity and Time Allocation for Army Heavy Brigades. B. Hallmark, J. Crowley, T. Lippiatt, P. Dey. September 1998.

Anecdotal evidence suggests that units find it increasingly difficult to train to standard. Training simulations and simulator devices are often proposed as a means of mitigating potential training shortfalls. However, if units do not have the time available to use such devices, their effectiveness will be limited. This document was prepared as part of a project addressing units' use of time for training, aimed at eventually understanding how simulations and simulators might be leveraged in an overall training strategy for heavy briagdes in CONUS. It documents a database that Arroyo Center staff constructed, based on unit visits, interviews with commanders and staffs, training calendars, quarterly training briefs, training guidance, and similar sources. The database describes training events in detail for major elements at six posts during periods for which data were available (focused primarily on the period 1997-1998).

DRR-1996-A The Army After Next: Exploring Air-Mech and Vertical Envelopment Concepts and Technologies. J. Grossman, J. Matsumura, R. Steeb, J. Gordon, T. Herbert, W. Sollfrey. December 1998.

The Army After Next (AAN) concept of rapidly deployable mechanized battle forces in a tactical environment requires the forces to be readily transported by vertical, or near-vertical, lift aircraft. In the nonlinear AAN battlefield, this may require the forces to be deployed near the enemy's second echelon. The authors examined the performance of the notional AAN advanced airframes to survive this initial air maneuver/insertion under a variety of conditions. These included level of situational awareness and intelligence provided to pilots, level of SEAD (suppression of enemy air defenses), flight tactics and ingress routes used by the pilots, and signature characteristics of the airframes (both RF, IR, and optical). The authors used high-resolution constructive simulations to explore and assess the airframes' survivability against an integrated air defense system operating in mixed terrain. The air defense system was one the Russians are capable of deploying today. The results of the analysis indicate that no one approach can guarantee aircraft survivability. Combinations of aggressive SEAD, use of stealth technology, and enhanced situational awareness can, under certain conditions, result in good survivability rates for the aircraft. The large size and slow flight speeds of the aircraft, however, make them susceptible to optically guided munitions. These weapons are difficult to both find and counter. New technologies, tactics, and

techniques will be needed to deal with this threat if the AAN air insertion concept is to succeed.

DRR-2019-A Examining the Number of Crusaders for the Future Army. J. Gordon, J. Matsumura, R. Steeb. January 1999.

When the Army was asked by Congress in late 1998 to answer five questions related to the Crusader self-propelled howitzer system, the chairman of the Army's Crusader Study Advisory Group asked Arroyo for insights on how many Crusaders would be required as the Army transitions from Army XXI (roughly 2000-2010) to the AAN era (approximately 2010-2025). This briefing outlines three possible visions that the Army could adopt over the next two or three decades. These visions were developed from position papers the Army staff was preparing that chart several different major courses of action the Army could pursue from now through roughly 2025. Each vision postulates a different role and quantity of mechanized (heavy) forces. Depending on which course of action the Army actually follows, the quantity of Crusaders would be affected. The authors conclude that since the AAN era force structure is not yet known, it is important for the Army to retain, for as long as possible, the maximum amount of flexibility in Crusader procurement plans.

DRR-2041-A Improving Army PPBES: The Planning Phase. L. Lewis, H. Thie, R. A. Brown, J. Schrader. May 1999.

This draft documents work on the planning phase of the Army Planning, Programming, Budgeting, and Execution System (PPBES). The Arroyo Center was asked by the Army Deputy Chief of Staff for Operations (DCSOPS) to assess how effective the reengineering of the Army planning and programming process was in fiscal years 1995 and 1996. The Army modified its planning and programming documents and asked the Arroyo Center to assess several of these documents to determine the extent to which the reengineering that had been done was successful, and to suggest improvements. This draft focuses on The Army Plan (TAP), the document that links planning to programming and provides the initial programming guidance to the Army Program Evaluation Groups (PEGs). This draft provides an assessment of TAP 2000-2015 and its Mission Areas (MAs) and recommends improvements for TAP 2002-2017. The authors identify several problems in TAP 00-15: mixing of operational and institutional functions, overlapping areas, overly broad and inappropriate MAs, unwieldy structure, and imprecise performance measures. With respect to TAP 02-17, the authors recommend that the Army reduce MAs to those that focus on operational missions and realign the MA hierarchy; start MA assessments prior to the publication of Army strategic planning guidance and the beginning of TAP work; and consider placing responsibility for the MAs and assessments (but not TAP) in a different section of DCSOPS to give it greater linkage to strategic planning.

DRR-2072-A Reconfiguring the Army's Installations: A Legal and Regulatory Overview. J. Bondanella, R. Kedzior, W. M. Hix, J. Sollinger. April. 1999.

The Army's installation structure has altered considerably under the pressure of past changes, recently through the recommendations of the three Base Realignment and Closure (BRAC) commissions, and it is all but certain to alter again to accommodate future changes. It is not clear when or even whether more BRAC commissions will be created. Thus, it is a good time for the Army to determine what authority it has to reconfigure its installation structure in the absence of further BRAC legislation. That is, what authority does the Army have to open, close, and realign installations, or change the way it provides services to the military members who serve on them? While certain portions of federal law appear to grant the Army considerable legal authority to reconfigure its installations, other provisions limit that authority. Nevertheless, thresholds in the legislation that are set very low and interactions among thresholds combine to give the Army only modest authority to reconfigure installations. In addition to the legal constraints, special-interest advocates both inside and outside the Army may prevent it from taking action, even when that action falls within the Army's legal authority. This draft discusses the salient points of BRAC legislation history, which traces back to the 1960s, and the provisions of current legislation. It recommends the development of a strategic planning process, a strategic installation plan, and a collaborative decision process with non-Army organizations including state and local governments, private business, and community interest groups, as well as the Congress and other Defense Department agencies.

ANNOTATED BRIEFINGS

AB-100-1-A Improving Training Resource Management. S. Way-Smith, M. G. Shanley. June 1996.

The Arroyo Center is performing ongoing research in support of the U.S. Army's efforts to implement efficient manpower resourcing and training strategies. To gather information the researchers held interviews with Department of the Army and Training and Doctrine Command (TRADOC) staff and compiled resource case studies of several private-sector firms, universities, and the Air Force. This annotated briefing outlines the systemic problems and issues concerning the current methods of resourcing manpower. The briefing also summarizes three effective concepts used by private-sector firms and illustrates how the Army might use these concepts to improve the resourcing process as well as efficiency. The briefing concludes with a recommendation to test these private-sector concepts at a TRADOC installation to determine their efficacy for improving the resourcing process.

AB-101-A Methodologies for Incorporating Information Operations into Constructive Simulations: Status Report. L.R. Moore, III. March 1996.

The Army has embarked on an ambitious sequence of innovative analysis efforts, the advanced warfighting experiments (AWEs), designed to yield insights into how to build Force XXI. AWEs are live exercises integrated with virtual and constructive simulations. Information operations will play a large role in Force XXI, and their effects must be adequately represented in the AWEs. Although insights from live exercises and virtual simulations are valuable in showing how human decisionmakers obtain and integrate information into their operations, as analytic methodologies they lack sufficient control, replication, and scope to stand alone. Consequently, constructive simulations will also be used in the AWEs. The problem of simulating information operations in constructive simulations has proved intractable to standard approaches. The Arroyo Center is approaching the problem from two directions: improved representations of information operations processes and improved simulation-based analysis methodologies. The project has three tasks. (1) Representation: examine methods for representing information operations in constructive simulations and how those operations are represented in current models. (2) Analysis: describe how new analysis techniques can aid in the analysis of issues involving information operations. (3) Demonstration: perform an exemplar analysis of an issue and recommend areas that look promising for the future. This annotated briefing reports on project progress to date.

AB-102-A Ensuring Personnel Readiness in the Army Reserve Components: Summary Briefing. B. R. Orvis. June 1996.

This briefing summarizes and builds on earlier RAND research (reported in MR-659-A) that examined the extent of personnel cross-leveling during Operation Desert Shield/Storm (ODS/S), the reasons for it, the likelihood of serious personnel shortfalls in future deployments and, based on these findings, the types of policies that could enhance the Reserve Components' readiness to deal with future contingencies. Results suggest that economic incentives to reduce personnel turnover could improve peacetime job qualification levels considerably, potentially at little or no net cost to the Army. The briefing also reports the results of analyses to design a controlled field experiment to pilot test the economic incentives (personnel turnover-reduction bonuses) recommended in MR-659-A. These analyses concern establishing the sizes of the bonuses to be tested, the number of test cells required, the criteria for assigning units to the test cells, and the number of units to be assigned to each cell. The bonuses are intended to reduce the rate of job changes by up to half and the attrition rate by one-fourth. Based on the analyses, the report recommends a three-cell test design, including a control cell, $250 bonus cell, and $900 bonus cell. The USAR's Force Support Package (high-priority units) comprises the test units, most of which would be assigned to the control cell. Up to three-fourths of the cost of the test could be offset by the resulting reductions in training and recruiting requirements.

AB-103-A Commercial Satellite Communication Systems Study: Executive Summary. E. Bedrosian, G. K. Huth, K. M. Poehlmann, S. J. Pond, G. I. Taylor. June 1996.

This document presents a feasibility analysis of the military use of commercial mobile satellite systems—such as Loral Cellular Systems Corporation's Globalstar and TRW's Odyssey—to meet the critical need for beyond-line-of-sight communications while on the move. These systems are designed to provide inexpensive global voice and data service for handset users. The authors identified several enhancements that could lead to improved satisfaction of the military requirements, including: (1) incorporating GPS receivers to enhance geolocation; (2) embedding end-to-end encryption for voice and data; (3) using enhanced transportable terminals with low sidelobe directional antennas; and (4) deploying military gateways to permit the use of secure CDMA spreading codes. The authors had several recommendations: (1) convince satcom system developers that the size of the Army demand is bigger than estimated; (2) interact with satcom system developers to promote desired features favorable to a consolidated user base; (3) modify Army doctrine, procedures, and training to improve the use of mobile satcom systems; and (4) conduct feasibility and cost analyses of military enhancements.

AB-106-A Metrics for the Army's Stockage Determination Processes. K. Girardini, L. Miller. June 1996.

There are four distinct echelons of stock where inventory is typically held in the Army to provide a buffer between demand and supply: wholesale (NICPs), GS supply (DOL and Corps), SSA (division, nondivisional, and DOL), and unit level (BN or CO). At each inventory point in these echelons, a stockage determination process transforms a complex set of policies, constraints, and data into requirements objectives and reorder points, which supply managers use to manage inventory levels. We propose three categories for metrics to evaluating these inventories: (1) responsiveness of support from the customer's perspective, (2) materiel and operating costs and deployment footprint (for TOE units) associated with inventories, and (3) the resources expended to execute the stockage determination process. The primary example under (1) is customer wait time, which is how long customers wait for an order to be filled. The primary metric under (2) is inventory position, the sum of the on-hand assets and due-ins (replenishment requisitions that have not been received) minus due-outs (customer requests on backorder). In each category we also propose secondary, diagnostic metrics.

AB-108-A Improving CSS Command and Control Staff Training: Project Review. J. Bondanella, M. Lewis, S. Way-Smith, J. Winkler. July 1996.

This annotated briefing describes ongoing research aimed at finding and recommending improvements for staff training in higher-echelon support units. A review of staff training in the military and commercial sectors illustrated aspects that should change to make training more effective and responsive to future organizational and doctrinal changes. Training of large staffs should be a continuum, starting with preparation and extending across a range of deployment and redeployment activities. However, units are hard-pressed for time and are able to exercise in only a small part of the continuum. Training in the business world is discussed in terms of its emphasis and what it suggests with respect to designing training and measuring performance.

AB-109-A Evaluation of Performance Drivers in the Depot and Transit Segments of the Order and Ship Process. K. Girardini, W. Lewis, R. Eden. September 1996.

This annotated briefing documents an analysis of the order and ship time (OST) performance of the depot and transit segments of the Army's order and ship processes. It focuses on OST for orders for spare parts (Class IX) that were filled from major depots in the second quarter of 1995. Backorders are excluded from the analysis. The analysis shows that the median OST for the depot and transit segments alone typically exceeded even the short-term Velocity Management goals for the entire order and ship process. In the depot segment, there were two distinct levels of service, air eligible and routine, but their use did not consistently reflect customer-assigned priorities. In particular, IPG1 and IPG2 requisitions without RDDs are downgraded to routine status. In the transit segment, installations ordering parts received significantly different service levels depending on the proximity of the depot filling the requisition and the mode of shipment used. In this segment, too, service levels did not consistently reflect customer priority. Where the volume of shipments between an installation and depot is high enough to permit daily or almost daily deliveries, scheduled trucking could provide a very quick, reliable, and relatively inexpensive transit mode. A variety of actions are needed to increase the opportunities to use this mode. To improve OST in the depot and transit segments, the Army must establish strong partnerships with both DLA and the commercial carriers.

AB-110-A Providing Resources for Instructors and Training Developers. M. G. Shanley. August 1996.

This document presents emerging results from a case study begun at Fort Knox in the late spring of 1996. The research is part of a two-year effort that seeks to develop new methods that TRADOC can use to manage its resources in the new, emerging training environment. Preliminary conclusions from the case study are that (1) activity-based analysis shows how current resourcing factors are inaccurate, and (2) activity-based costing data can provide a basis to revise those factors and to support the process of resource reallocation.

AB-113-A Three RSOI Planning and Analysis Issues. D. Kassing. September 1996.

Reception, staging, onward movement, and integration (RSOI) of deploying forces have gained renewed prominence since 1990. As a result, the Army has made substantial progress on RSOI training, doctrine, and information systems. Further improvements should address (1) how to model RSOI processes, (2) planning for RSOI when deployment operations are likely to be attacked, and (3) how best to report the status and progress of RSOI operations. Modeling for RSOI should compare the needs of deployers and the capabilities of RSOI support providers. Planning work should quantify and analyze requirements for support associated with both the flow of military personnel and the delivery of equipment. Such modeling will show the time-phased needs for RSOI capabilities and help make the case for timely RSOI provider deployments. Potential enemies are gaining modern capabilities for attacking U.S. deployments. RSOI activities generally present attractive targets. But RSOI "under fire" has not yet received serious attention by Army or joint planners. Leadership attention, doctrine, and training are needed. Reporting for RSOI tends to focus on the activities and accomplishments of RSOI providers. However, the information needs of deploying units also need to be addressed. In addition, RSOI reporting should provide CINCs and their staffs with the information and estimates needed for campaign planning. A common, web-like network can meet the three needs. Total asset visibility is a vital input for all purposes.

AB-117-A Ethnic Conflict and State Breakdown: Final Results. T. S. Szayna, A. J. Tellis, J. Winnefeld. October 1996.

This annotated briefing presents the results of the final task of the project "Ethnic Conflict and the Processes of State Breakdown: Improving Army Planning and Preparation." The briefing focuses on the project's findings on the paths to violence and ethnic conflict. Using a model of ethnic strife developed at an earlier stage of the project, the briefing focuses on the potential outcomes of an interaction between a mobilized group and the state. In any given situation, based on the characteristics of the mobilized group and the state, a continuum of outcomes is possible. The continuum ranges from peaceful accommodation to massive violence and attempted genocide. The briefing identifies which characteristics of a mobilized group and the state are particularly worrisome from the standpoint of possible violence.

AB-122-1-A Staffing Alternatives for ROTC Battalions. C. A. Goldman, M. G. Mattock, B. R. Orvis, D. A. Smith. January 1997.

The Army desires to find ways to reduce the number of active duty personnel devoted to ROTC battalions. Specifically, the TDA Army Institutional Redesign Study, Umbrella Issue 41, proposes a mix of Active Component, Reserve Component, and contracted retired personnel to staff ROTC. This research includes two main elements: description of the options (staff mix, resource demands, and implications for training and recruiting) and a test design (evaluation requirements, site selection, costs, and any legislative requirements). In this briefing, we consider alternatives for staffing ROTC battalions. We present staffing alternatives, assess the potential of the alternatives to replace AC soldiers, lay out an evaluation framework, and draw relevant implications. In addition to this exploration of staffing for battalions, the Army is currently considering several alternative structures for organizing ROTC above the battalion level.

AB-124-A Power Projection in the 21st Century: Forces and Concepts—Executive Briefing. L. R. Moore. February 1997.

This annotated briefing describes a project that helped the Early Entry, Lethality, and Survivability (EELS) Battle Lab assess concepts and forces for projecting power projection in various situations the Army may face in the future. These concepts emphasize the new capabilities and forces envisioned by EELS studies, which have initially focused on the organization, effectiveness, supportability, and deployability of the 2K, 10K, and Middleweight early-entry forces. The 10K Base force is an existing division(-) with 1999 projected equipment. The 10K Org force is a reorganization of the 10K Base force with added MLRS and attack helicopters. The 10K Rec force was recommended in the TRAC "Middleweight" study; it is the 10K Base force with technologically enhanced close-battle capability. The project helped the EELS Battle Lab evaluate the effectiveness of such forces. It also examined how the effectiveness of those forces depends on scenario factors such as objectives, terrain, timing, enemy capabilities, and constraints on force employment. This evaluation was conducted at the operational and theater levels, deploying the early-entry forces to nearly simultaneous MRCs both in Southwest Asia and Northeast Asia.

AB-134-A Using an Activity-Based Approach to Improve Training Resource Management. M. G. Shanley, J. Crowley, J. Winkler, J. Larson. January 1997.

In an era of cost reductions, the Army's Training and Doctrine Command must find ways to foster cost-effective innovation. "Distance learning" is one major option that has been chosen, but improving the management of residential training also plays an important part. On the basis of a review of resource management methods used in private industry, this briefing argues for the use of an activity-based management framework in the current rapidly changing training environment. The briefing also demonstrates the feasibility and usefulness of this approach in a case study at the U.S. Army Armor Center, Fort Knox.

AB-141-A/OSD Recent Recruiting Trends and Their Implications. B. R. Orvis, B. J. Asch. February 1997.

Using two analytical approaches, the authors examined enlisted supply in the recent past and concluded that more potential recruits have been available relative to accession needs than before the military drawdown. The picture for FY97, however, is less bright. Specifically, the significant increase in FY97 accession requirements coupled with a smaller decline in youth's interest in military service translates into a possible supply shortage. Moreover, the analysis suggests difficulties in converting potential supply into enlistments, including reduced recruiter productivity. It is likely that a number of factors are responsible for the supply conversion difficulties. The implication is that a given accession mission will require more recruiting resources or different management than in the past. This annotated briefing recommends a number of actions to meet FY97 recruiting objectives. One is to consider increasing recruiting resources: specifically, increasing advertising, educational benefits, and recruiters. Past research has shown these to be the most cost-effective resources for expanding the high-quality market. A second option is to reduce the requirement for high-quality non-prior-service male accessions by recruiting more women, accepting more prior-service accessions, or lowering the percentage of recruits who must have high school diplomas or score in AFQT Categories I–IIIA. There are likely to be constraints, however, on the feasibility and desirability of such substitutions. These constraints must be considered in optimizing the balance between making such substitutions and increasing recruiting resources to meet accession requirements.

AB-142-A Incorporating Information Operations into Constructive Simulations: Executive Briefing. L. R. Moore. February 1997.

The "knowledge-based warfare" revolution, enabled by rapid improvements in information technologies, presents the Army with new opportunities and challenges. To respond, the Army must improve its ability to analyze, model, and simulate the effects of not just information operations (IO), but the entire command, control, communications, computers, intelligence, surveillance, and reconnaissance functional spectrum. This briefing identifies ways to improve the representation of IO (and its effects) in constructive simulations to identify more clearly its impact on combat outcomes. The briefing describes a conceptual framework for "operations that use information," reviews the current representation of IO in a number of Army constructive simulations, and identifies methodologies appropriate to the analysis of IO issues. Attention is focused on the needs of the analysis

community to support the development of information systems and processing structures for the Knowledge-Based Army, both in the short and long term.

AB-143-A Generating Revenue to Help Offset Declining Infrastructure and R&D Budgets. K. Horn, S. Galing, I. Chang. April 1997.

This annotated briefing examines two concepts for generating revenue: expanding revenue generation from infrastructure assets, and exploiting the entrepreneurial features of new contractual instruments—Other Transactions (OTs)—to create return-on-investment R&D funds. In terms of the first concept, the research shows that while the Army has used infrastructure assets to generate revenue in the past, it has not generated much money; however, opportunities are greater today, especially given a proposed change in the governing statute that would permit greater flexibilities in implementing business-like approaches. In terms of the second concept, using OTs to create revolving R&D funds—something DARPA has recently experimented with—could enable Army-funded R&D activities to become self-sustaining. Before taking action, the Army needs to determine what opportunities exist, what the associated administrative burden/increased oversight of such opportunities would mean, and what it can do to protect against budget cuts that might offset revenue generation.

AB-146-A Financial Management PIT Report to the Velocity Group. M. Brauner, J. Bondanella, E. Pint, D. Relles, R. Eden. April 1997.

As the Army has applied Velocity Management (VM) to key logistics processes such as order and ship, repair, and stockage determination, it has uncovered anecdotal evidence that some delays and errors in these processes can be traced to the performance of the logistics financial management (FM) process. VM process improvement teams (PITs) have been able to confirm these anecdotal complaints with observations. Excessive financial reviews have been shown to slow the processing of requisitions. The management of depot-level repairables is made more difficult because of complex credit policies and pricing structures. The realignment of authorized stockage levels is hampered because units know that the money received for returns to stock will decrease if large numbers of items are returned. The hectic end-of-year financial close-out is the most salient evidence that some financial processes need improvement. Improvements to the speed and accuracy of basic logistics processes should not be hampered by an FM system that is not also fast and accurate—that creates errors and delays and places obstacles in the path of efficiency and effectiveness. Recognizing the need to improve the performance of the logistics FM process, the Velocity Group formed an FM PIT. This annotated briefing describes the progress the FM PIT has made in applying the VM methodology of Define-Measure-Improve to the logistics FM process. The work to date has focused on defining the process and conducting exploratory measurements to test the utility of some candidate metrics.

AB-149-A Using Velocity Management to Improve Processes for Deploying Army Logistics Capabilities: Initial Results. D. Kassing, M. Lewis, M. Melius, W. O'Malley, R. Stanton, J. Bondanella. May 1997.

Successful Army support of contingency operations depends on timely deployment of logistics capabilities. This annotated briefing focuses on a three-step approach—define, measure, improve—to examine Army deployment processes for logistics units. The work addresses fort-to-port planning, training, and execution and, to a lesser extent, reception, staging, onward movement, and integration (RSOI). Though Army deployment processes are formally defined in doctrine, detailed definition reported here has been done on the basis of visits to several Army logistics units. Process-charting techniques are applied and results presented. Process-charting helps identify appropriate metrics for measuring deployment performance. Specific metrics for deployment time, quality, and cost are suggested. Preliminary observations for improving Army logistics deployment performance are presented in four categories: (1) planning and training for fort-to-port movement, (2) executing fort-to-port movements, (3) other fort-to-port improvements, and (4) RSOI. Future work will develop these potential improvements and address the complex interactions of Army and Joint deployment activities.

AB-150-1-A Support Unit C^2 Training for Force XXI: A Process Approach. J. Bondanella, M. Lewis, G. Park, J. Winkler, J. Sollinger. July 1997.

As the U.S. Army evolves into a "force-projection Army," its ability to deploy quickly and conduct missions away from its garrison location places increasing importance on effective logistics command and control. The Army is also being called upon to provide logistics support to many international efforts, further highlighting the need to design effective logistics doctrine, organizations, supporting technology, and training to carry out complex logistics missions over great distances with little existing infrastructure. These challenges and changes to how logistics management will occur in an increasingly information-rich and distributed environment provide the opportunity to reexamine training for support staffs above the division level. How might the Army change its training to best prepare for new styles of logistics management? The authors argue that the current structure, content, and methods of training high-level logistics staffs will not answer the needs of the Force XXI Army; rather, they propose an alternative approach based on a process view of training and the use of microworld models in a training curriculum. They illustrate such an approach with examples derived from the Theater Support Command's Reception, Staging, Onward Movement, and Integration mission and from its distribution management mission.

The authors believe more effective training can be accomplished without a significant increase in resources.

AB-152-A Stability and the Military in Mexico: An Assessment of the Military in a Changing Mexico. K.M. O'Connell, K.F. McCarthy. May 1997.

Mexico is in a period of political, economic, and social transition. During this period, public confidence in the presidency and other institutions is low, and the Mexican military is being asked to take on a greater role within Mexican society. This annotated briefing undertakes an institutional analysis of the Mexican military, assesses its changing internal and external operating environments, and considers the changing nature of threats to Mexican society, such as narcopolitics, corruption, and insurgency. The authors describe the Mexican military's response to these challenges, including a newfound emphasis on national security, modernization, and some increased public accountability, as well as select cooperation with the U.S. military. Finally, the briefing raises some key future issues to be considered in evaluating the Mexican military's performance (as well as U.S. options for dealing with it) in this dynamically changing environment.

AB-157-1-A Modifying Credit, Price, and Surcharge Policies to Encourage More Cost-Effective Supply and Repair Decisions. M. Brauner, E. Pint, D. Relles, J. Bondanella, R. Eden. September 1997.

This briefing describes four problems arising from Army Working Capital Fund (formerly DBOF) credit, price, and surcharge policies: (1) financial uncertainty is created because credits depend on the installation's stockage position; (2) units may stop making turn-ins because of caps imposed on each MACOM's total credits issued to customers in FY97; (3) averaging of retail credit rates within Materiel Categories obscures the true cost of repair; and (4) surcharges distort decisionmaking by including costs unrelated to supply and repair. The authors recommend changes to credit, price, and surcharge policies that could ameliorate these problems. They also discuss the benefits and implementation issues.

AB-160-1-A Assessment of OPMS XXI. W. M. Hix, J. D. Winkler. July 1997.

The Army plans to institute a revised officer personnel management system, focusing its principal changes on the management of the field-grade officer force. The plan's most significant features—increased specialization and improved promotion opportunities for those not selected for command—constitute relatively minor policy changes when viewed in the context of the entire breadth of possible change. Although there are drawbacks and uncertainties associated with the new policies, by most assessment criteria, the changes should have positive outcomes. Foremost among the uncertainties is how the officer corps will respond to what amounts to a cultural change. Second, the new system represents a partial solution—it pertains only to field-grade officers—raising the question of compatibility with later proposed changes to other segments of the officer force. On the whole, though, the changes appear reasonable and modest, with low risk.

AB-162-A Technologies for Training: Insights for NCO Leader Development. M. W. Lewis. September 1997.

This annotated briefing documents a presentation at the Future Leader Development of Army Noncommissioned Officers Workshop. It was designed to help attendees understand the important features of existing and emergent technologies for training and their current and potential benefits. It was also intended to provide a stimulus for further thinking on possible roles in NCO leadership training for which technology might—or might not—be appropriate. Many changes in use and new applications of education technology lie ahead. It is the task of the NCO trainers to understand the new tools for training and leverage them appropriately to meet their needs. The more the NCO community understands these new tools, the better, more demanding consumers they become.

AB-165-A QDR Drawdown of the Active Force. B. R. Orvis. August 1997.

The Assistant Vice Chief of Staff of the Army requested assistance from the Arroyo Center in designing the drawdown of 15,000 Active Component soldiers mandated by the Quadrennial Defense Review (QDR). The briefing examines the guiding principles promulgated for the QDR reduction and other force shaping goals that the Army wishes to accomplish during the same period. These additional goals involve changes in force structure and inventory to make them more compatible and to reduce costs. The author examines the mutual compatibility of these goals and principles. The briefing reviews the strategy developed by the Office of the Deputy Chief of Staff for Personnel (ODCSPER) for executing the changes. The briefing also discusses steps the Army can take to help ensure the fulfillment of its goals for the QDR reductions and force restructuring actions.

AB-166-A Leadership Development in the Private Sector: Trends, Progress and Speculation. B. A. Benjamin. September 1997.

This annotated briefing documents a presentation at the Future Leader Development of Army NCO Workshop. Leadership development has become increasingly important in the private sector, and organizations are spending more then ever on leadership education and training; yet it is not certain whether such development efforts are effective. The author identifies the changing role of executive education in the workplace and discusses how organizations are redesigning their development efforts to meet new demands. A review of the current state of research and empirical work on leadership

development reveals that sound evidence on the effectiveness of training continues to be scarce. The author concludes with some speculation on the demands that leaders will face as they move into the 21st century, and suggests some changes that will need to be made in leadership development to meet these demands.

AB-169-A Evaluating the Military Utility of Ground-Based Acoustic Sensor Networks. J. D. Pinder, G. Halverson, R. Bowdish. September 1997.

Advanced acoustic sensor networks are capable of detecting, locating, tracking, classifying and, in some cases, identifying military ground vehicles on the battlefield. This annotated briefing describes an advanced acoustic sensor model developed at RAND and integrated into JANUS for use in force-on-force military simulation. The model addresses the key aspects of a notional acoustic sensor network: sound source characteristics, sound propagation and attenuation, background noise, sensor performance, and the detection and location of targets. The impact of environmental changes, sensor placement and network configuration-in terms of both system performance and operational utility-can be explored using this model. Ultimately, this work is intended to demonstrate how networks of advanced acoustic sensors can be employed by a small, robust military force; it also highlights the limitations of such networks. The development of this acoustic sensor model and the subsequent system-level simulation and analysis were an integral part of the Rapid Force Projection Technologies project.

AB-170-A Executive Overview: Financial Management: Dramatic Process Improvement is Possible. M. Brauner, J. Bondanella, E. Pint, D. Relles. August 1997.

The Financial Management Process Improvement Team (FMPIT) has begun mapping financial processes, including credit flows, the year-end financial process, and the financial process with ILAP, as well as several installation-specific maps. It has also identified and applied some candidate metrics, including measurement of the number and size of price discrepancies between prices quoted and prices billed to units for items ordered from wholesale supply. In the data analyzed, 13 percent of the requisitions showed a difference in price between requisition and receipt. Credit variability was also identified as a candidate measure of financial management performance. An exchange price system would reduce the uncertainty created by the Army's current retail credit policy. It would also bring additional benefits, such as closer links between credits and the costs of transportation, repair, and restocking, as well as a reduction of lag time between turn-ins and credit receipts. Aside from stabilizing prices and credits, the Army should also consider modifying financial management policies to promote more cost-effective behavior. Among other activities, the FMPIT is continuing to analyze unit reconciliation, focusing on streamlining the process and identifying the preferred command level for financial management activities. (See related document, AB-149-A).

AB-171-A TF XXI AWE Battle Command Analysis. J. Grossman. August 1997.

This annotated briefing examines the affect of new technology, deployed in the Task Force XXI Advanced Warfighting Experiment, on the commander and his battle staff. In many cases, the technology slowed down the decision cycle, a critical aspect of battle command. The briefing presents technical, organizational, and training deficiencies that caused this problem and discusses potential solutions. In several cases, the technology significantly aided battle command. Lessons learned from these successes are presented.

AB-176-A Evaluating Alternative Systems Architectures: Executive Briefing. W. Perry, A. J. Rankin, L. R. Moore, T. Lucas. October 1998.

This work describes and demonstrates an analytic framework designed to assess the effectiveness of alternative systems architecture designs. The framework calls for the generation and evaluation of several alternative architectures using the network simulator OPNET to model the information systems and an exploratory analysis tool to evaluate the outcomes of simulation runs for each alternative. The model and analysis presented in this briefing have limited operational relevance. They do not represent the definition and analysis of an actual or proposed system. While the work is based on a real problem, the level of detail and the data used are fictitious. In addition, not all processes are modeled accurately. Rather, the objective is to demonstrate a proof of principle, and these simplifications make the process more understandable while not detracting from the analytic value of the work. Based on their work thus far, the authors believe that this framework can help analyze communications network performance. The framework shows good potential to represent, evaluate, and analyze C4ISR networks and tie information system performance to operational outcomes.

AB-177-A Measures of Effectiveness for the Information-Age Army. R. E. Darilek, J. Bracken, J. Gordon, B. Lewis, B. Nichiporuk, W. Perry. June 1998.

This annotated briefing reports on research aimed at developing measures of effectiveness (MOEs) for ground forces in the Information Age. The project was designed to help the Army identify new MOEs that can capture the improved effectiveness expected to accrue to ground forces as they exploit information-age technologies in the 21st century. The study pursues that objective in several ways. First, it employs a game-theoretic simulation to help define various levels of information-superiority that the Army could seek to achieve in the Information Age, as well as the potential implications of each level. Second, it

explores some of the implications of the predicted revolution in military affairs—in particular, potentially new warfighting characteristics that the Information Age promises to impart to the Army, as well as the other services. Third, it postulates an initial or preliminary set of MOEs for ground combat addressed to operational concepts presented in Joint Vision 2010: dominant maneuver, precision engagement, full dimensional protection, and focused logistics. Finally, the study suggests another set of MOEs, likewise keyed to Joint Vision 2010's operational concepts, but addressed in this case to stability and security operations (formerly called military operations other than war), that an information-age Army might have to conduct.

AB-180-A Pricing and Credit Policies Hamper Logistics Management. M. Brauner, J. Bondanella, E. Pint, D. Relles. October 1997.

This annotated briefing documents the Financial Management Process Improvement Team's briefing to the Velocity Group meeting on September 30, 1997, focusing on three problems. First, price (and credit) differences occur between the time an item is ordered and the time it is received. A number of policy changes may help stabilize prices and reduce the amount of time spent by unit personnel on manual financial reconciliation. These policy changes require changes to logistics and/or financial automated systems, and some require cooperation from other DoD agencies. Because ULLS, SARSS2AC/B, and wholesale sources of supply receive their catalogs through different processes, the Army also needs to ensure that prices are consistent across these catalogs. Second, the vast majority of returns to the RSF at Fort Campbell and Fort Hood were coded as "serviceable consumable items." It seems unlikely that it is worthwhile for units to undertake the effort to identify, label, and turn in these low-value items. Further analysis is needed to understand why so many serviceable consumable returns are being made and what remedial action should be taken. Third, Army retail credit policies create substantial financial uncertainty for OMA-funded units, because credit rates depend more on the installation's net asset position than on an item's physical characteristics, such as its reparability or serviceability. Unit-level financial uncertainty could be greatly reduced by delinking credit rates from the installation's stockage position. We also recommend that credits be set on an item-by-item basis to reflect the costs of transportation and restocking for serviceable items and the costs of repair, transportation, and restocking for unserviceable items.

AB-183-A Analysis of the M109/Paladin Supply Chain: Implications for Fleet Management. Mark Wang. October 1997.

This annotated briefing documents ongoing research support to the Army's M109 Fleet Management (FM) Pilot Program, an initiative aimed at outsourcing support of the self-propelled howitzer. This research analyzes the current M109 supply chain, which responds to customer requisitions by moving repair and replenishment parts from vendors through the depot and distribution system. Backorders are a major problem—a third of wholesale requisitions—and the author suggests a substantially changed item-management process based on the commercial paradigm of consumption-based resupply, or "pull" replenishment, of the wholesale system. A challenge for the FM contractor will be to manage the vendor base and establish replenishment contracts so requisitioned items are available for issue. For in-stock items, leveraging economies of the existing Army distribution system is recommended. The changes suggested can all be made within a graceful implementation plan and transition strategy not affecting troop activities.

AB-185-A "Optimum" Inventory Levels for AMC-Managed Items. K. Girardini, A. Kaplan. January 1998.

As the Army draws down its supply inventories from very high Cold War levels (about $18 billion in 1989), the question arises of what the "right" level is. The Arroyo Center addressed this difficult question in partnership with AMSAA, the Army analytic agency charged with developing the models used to calculate inventory requirements. The Arroyo/AMSAA analysis showed that despite eight years of aggressive inventory reduction, the Army still holds significantly more assets on hand (about $8B) than its own models would suggest are optimum (about $4B). Moreover, the optimum level can be expected to fall by as much as 50 percent (to about $2B) as Velocity Management and other Army initiatives take effect. Such initiatives are dramatically reducing the Army's repair cycle times, reducing procurement lead times, and reducing procurement quantities. Reducing inventory requirements permits the Army to save money by avoiding some procurements as existing assets are drawn down; reducing inventories kept on hand should permit the Army to save money by reducing its supply infrastructure.

AB-188-A "Achieving True Savings from Logistics Efficiencies. J. G. Bolten, C. Hanks. September 1998.

At the direction of the Chief of Staff, Army, the Office of the Deputy Chief of Staff for Logistics and the Army Materiel Command developed 14 primary initiatives ("logistics efficiencies") to reduce the cost of the Army logistics system. This briefing examines these initiatives in the context of the general problem of how to achieve real savings for the Army from improvements in the logistics system. The authors assess each initiative's ability to achieve its programmed savings, and they address the question of whether these savings represent reductions in expenditures for the Army as a whole. In general, process improvements are the key to achieving long-run savings. True savings for the Army must come from reduced expenditures for personnel, facilities, materiel, or contracted services. Without these reductions, apparent savings will only be cost shifts to other organizations. Moreover, savings may be either one-time

or recurring, and may occur either within the operating funds or the working capital funds. Five of the logistics efficiencies have the potential to achieve real recurring savings. Four other initiatives can achieve real one-time savings through reductions in existing inventory levels. The final four initiatives may not achieve any real savings for the Army. The metrics proposed to monitor the initiatives need to be improved so that they measure the extent of true savings.

AB-190-A Criteria for Assessing Price and Credit Policy Alternatives. E. Pint, M. Brauner, R. Eden. March 1998.

This annotated briefing proposes a set of criteria to evaluate the Army's price and credit policies for spare parts and repairs. Because prices and credits affect logistics decisionmakers throughout the Army, it is important to develop criteria from an Army-wide perspective. A "good" price and credit policy should permit commanders to maintain operational tempo; encourage the appropriate use of local versus depot repair; reduce incentives for lateral redistribution; facilitate the adjustment of local inventories; reduce reliance on credit; reduce wholesale inventories; and maintain the solvency of the wholesale and retail stock funds. The briefing uses the proposed criteria to compare two current and two proposed policies.

AB-194-A Future Army Forces: A Capstone Project's Initial Report. R. E. Darilek, B. Nichiporuk, M. Leed. January 1998.

The first in-progress report explains what a capstone project is, namely, a largely synthetic effort that draws heavily on other Arroyo Center, Army, or defense community work in progress or already completed. The intended audience for Arroyo's capstone projects consists of both senior Army leaders and the broader defense community. The objectives of this project are to inform and influence thinking about future Army forces, both their operational concepts and their technological application, and address major planning challenges facing the Army over the next ten years. The presentation identifies a planning window for the Army and its Army After Next (AAN) exercises extending out to approximately 2008, and suggests four possibilities for making use of that window: (1) study various future force options, but wait until 2008 or so to decide; (2) pursue experiments and create prototypes of future forces; (3) commit to certain types of future forces and systems; and (4) develop some mix or hybrid of the other options. The rest of the presentation describes progress achieved during the first quarter of work on the project's three tasks: (1) address key issues emerging from ongoing future-force studies, in particular the AAN exercises; (2) explore alternative paths to Army XXI and AAN; (3) analyze user-developer dialogues on future forces. The document concludes with observations on the nature of each task. The challenge of Task 1 (issues) involves contraction: how to control the growing number of AAN issues and how to identify and focus on those that are "key." The challenge of Task 2 (alternative future paths or scenarios) involves expansion: how to broaden consideration of future worlds; how to hedge against a variety of possibilities. The challenge of Task 3 (technology) involves alternatives—in particular, whether and how to launch any new science and technology initiatives in or for the Army.

AB-199-A Joint Interoperability of Force XXI: Comparison of Service Information Architecture Developments. J. Jacobs, E. Harris, P. Steinberg. December 1997.

This draft documents an Arroyo Center study for the Army Deputy Chief of Staff for Operations and Plans, focusing on comparing service information architecture (IA) developments in the period 1996-1997 and identifying potential problem areas about joint interoperability of Force XXI. The draft is organized around four questions. The first is posed to summarize the status of service IAs before 1996. The authors found that each service was organized differently and that the Army's well-defined organizational structure led to a strong technical architecture (TA). The second question considers the services' CIOs and their impact on IA developments. The authors note their influence, and find that specific contributions reflect their service's IA development status. The third question explores the service IA approaches to support joint operations. The Navy and Marines are explicitly integrating joint operations into their IAs, but there is a reluctance by Army architecture developers to likewise integrate joint operations into their mainstream architecture products. The fourth question considers the Army's success in integrating its TA and operational architectures (OA) into the Army system architecture (SA). The research indicates that information system migration to the Army TA is progressing. But there are few successful examples of OA products and recommendations incorporated into this process in a timely fashion. The report makes three recommendations: (1) The Army CIO should continue and perhaps strengthen his management charter with respect to synchronizing the various pieces of the Army's IA; (2) the Army should expand its IA focus to embrace joint interoperability; and (3) the Army must continue to support developing the OA and SA and, importantly, the process for integrating the two.

AB-202-1-A Operational Architectures: Their Role in Achieving Joint and Army Vision 2010 Goals. S. Cammarata, I. Kameny, P. Steinberg. April 1998.

This briefing reports on an examination of the roles and status of operational architectures within the Army's information architecture effort in support of the goals of Joint Vision 2010 and Army Vision 2010, particularly the goals for information superiority and interoperability. The objectives of this research are to (1) review the guidance and direction given to operational architecture development efforts, (2) examine how operational

architectures can best fulfill their goals in light of this guidance, and (3) identify potential problem areas for operational architecture planning, development, and maintenance.

AB-208-A Maintaining Adequate Army Capability in Science and Technology. K. Horn, E. Axelband, I. Chang, R. Montgomery, M. Onesi, P. Steinberg, C. Wong. May 1998.

The Army wishes to reassess how it will perform S&T in a future that will be characterized by reductions in funding, in research, development, test, and engineering (RDT&E) infrastructure, and in in-house staffing of science and engineering (S&E). This annotated briefing presents midyear findings of a study helping the Army with this effort. The research shows that Army Materiel Command (AMC) is complying with S&T outsourcing guidelines, but that the guidelines may not be relevant in the future if the trend of reduced S&T continues. The research also shows that although Army labs clearly acknowledge how important it is for staff to have "smart buyer" (SB) capability, their actions—in terms of training and rewarding the staff performing the SB function—may not necessarily follow their words. In addition, AMC labs face serious S&E personnel problems; although the authors find that existing initiatives will solve some pressing problems, they will not rectify all S&E personnel issues. Finally, in terms of implementing new organizational structures, analysis of four proposed alternative structures shows that implementing any new system would alleviate some problems but create others.

AB-209-A Further Opportunities for Digitization—Interim Briefing. L. Joe, D. McArthur. May 1998.

This annotated briefing provides a focus for discussions on future information technologies and their potential impact on the Army. Based on results from Advanced Warfighting Experiments using new information technologies, the Army is currently organizing and equipping digitized units. Concurrently, the nonmilitary sector is developing and using new information technologies that continue to affect the restructuring of organizations and thus bring about higher effectiveness and lower operating costs. The authors develop a framework to understand the components of and interactions among information technologies, both in incorporating new technologies and in exploiting opportunities by modifying organizations. Initial observations from the study point toward two findings: (1) Information technologies are moving beyond information sharing toward "transaction-based networks." The Army needs to develop new system concepts to keep up with these trends. (2) Commercial firms are taking advantage of technologies by developing new organizational structures. The Army needs to systematically identify both the opportunities and the drawbacks to introducing these sorts of changes to the Army's unique situations.

AB-210-1-A Future Personnel Resource Manage-ment: Initial Report. B. R. Orvis, B. Nichiporuk, L. L. McDonald, D. Quigley, N. Sastry. August 1998.

The authors describe six alternative future worlds, then examine their related force requirements. Relative to today's force, the study shows that each of these future forces could require increases in soldier aptitude—if new equipment brought into the inventory by 2025 increases required AFQT scores for accession into the Army. But if new weapon and support systems can be designed to provide the desired additional capabilities without increasing aptitude requirements, then only half the forces might be expected to need larger percentages of soldiers in AFQT Category I-IIIA. Specifically, this would apply to OOTW-type forces, whose structures contain a larger percentage of Special Forces, military intelligence, and other high-aptitude soldiers. For similar reasons, the study notes that the same forces would have greater seniority and second-language requirements than today's forces do. Although the OOTW armies examined demand the greatest aptitude, they are smaller in size than the conventional forces examined. As a result, it is not the OOTW forces but rather more conventional forces that could increase Category I-IIIA accession requirements notably from today's number. The analysis suggests that such increases in aptitude needs will not result in problems of minority representation. Limiting new technology's impact on aptitude requirements might reduce the number of AFQT Category I-IIIA accessions needed by up to 5,000 to 10,000 recruits annually (allowing substitution of lower-aptitude, more readily obtainable recruits), depending on the particular force. Moreover, the analysis indicates that doubling the penetration rate in the college market could add up to 10,000 Category I-IIIA recruits. Overall, then, given some success in limiting the impact of new technology on aptitude needs and given greater penetration in the college market, a problem already faced today by the DCSPER, the analysis suggests that only much larger future forces would pose significant recruiting problems.

AB-212-A Improving Army CS/CSS Mobilization/ Deployment Processes: Interim Report. W. D. O'Malley, J. Halliday, D. Oaks, M. Baisden, R. Stanton. July 1998.

The changing nature of the Army's operational environment places a high precedence on the early deployment of both active and reserve CS/CSS units. The historical record and RAND Arroyo Center research indicate that these processes have not been consistent for recent contingency operations, nor have they always functioned as effectively as expected. This annotated briefing supplements work reported in AB-149-A. The project employs a three-step approach—define, measure, improve—to examine these processes, with a focus on the CONUS. Preliminary observations for improving performance include (1) charting and measuring the deployment process, (2) AC findings, and (3) initial RC findings. The mobilization/deployment of reserve units was found to be an ever more important element in force

projection—and its most challenging. Future work will look in more detail on reserve component issues and how the other services are addressing these challenges.

AB-214-A Quantifying Army Capabilities. D. Kassing, J. Gordon, D. McGarvey. June 1998.

This briefing reports progress on research that is developing an approach to measuring Army capabilities and relating them to national security strategy. Such measures will be appropriate for future debates about defense strategy and resource allocation. The approach first defines five Army core competencies that directly relate to current national security and military strategy: (1) prompt and sustained ground power for major theater war, (2) rapid-response, sustainable operations for small-scale contingencies, (3) face-to-face military engagement, (4) responsive support to domestic authorities, and (5) organizing, training, and equipping effective ground forces for these roles. Each core competency is also associated with at least one Army mission area. The briefing discusses problems in defining relevant metrics, proposes metrics for each Army core competency, and presents an illustrative calculation for heavy force firepower.

AB-215-1-A Joint/NATO Interoperability Issues for Force XXI: Final Report for FY98. E. Harris, S. Cammarata, J. Jacobs, L. Jamison, I. Kameny, P. Steinberg. August 1998.

The structuring question of this briefing is: "What are the key Army initiatives that need attention for achieving Joint interoperability and synchronization?" There are three main study findings. (1) Architecture framework guidance is insufficient and needs to provide consistent, clear, and detailed guidance for the following: well-specified process, products, and standards; OA/SA integration in a joint environment; and linkage to joint goals. (2) The Army needs a management initiative for interoperability/synchronization if it is to provide timely assessment of joint interoperability for operational, modernization, and training decisions. (3) A standardized interoperability metric (e.g., LISI-like) is needed to support POM-related tradeoffs analyses in a constrained resource environment. Our suggestion for improving the guidance for future OA and SA development is to ask the Army Science Board (ASB) to authorize an independent review panel to study framework guidance for OA development and OA-to-SA integration. Then the Army should consider authorizing DISC4 to revisit the Army Enterprise Architecture Framework Document with a focus on implementing actions to strengthen the OA development and OA-to-SA integration. In parallel, we suggest continuing strong Army participation in DoD activities such as the CISA C4ISR IPT that is developing the DoD architecture framework document, as well as activities involving the Joint Staff's development of Joint operational architecture. Our suggestion relative to the management initiative for interoperability/ synchronization is for the Army to initiate a planning activity that evaluates and ultimately adopts or develops a standardized interoperable metric and an associated methodology for supporting POM-related tradeoff analyses of information systems in a resource-constrained environment. To complete this analytical capability, an electronic OA/SA database representing the current configuration plus fielding status of Army information systems is needed.

AB-216-A Future Army Forces: A Capstone Project's Second Report. R. E. Darilek, B. Nichiporuk, M. Leed, J. A. Dewar. June 1998.

The second in-progress report focuses on the second task, which explores a wide range of illustrative futures that differ in their implications for Army missions and force requirements. Six potential future worlds in 2025 are presented and six different types of Army are associated with each of them. The six Army types break down roughly into two groups when it comes to manpower needs by 2025 in enlisted career fields. One group can be termed the "conventional warfare," and exhibits a common demand for significant numbers of infantry, armor, field artillery, and engineering personnel. The other group, which the authors refer to as "irregular conflict," exhibits a demand for military police, special forces, intelligence analysts, and linguists. Critical signposts to which worlds will be likely by 2025 will not appear for 10 to 15 years. Although it is difficult to make decisions on specific systems, unit organizations, or tactics until then, the authors contend that the Army can identify basic force characteristics that would seem useful (or "robust") across the board and pursue relevant technologies during the next 10 to 15 years.

AB-217-A Multi-Force Compatibility: Lessons from Past Operations. M. Zanini, J. M. Taw. June 1998.

Will technological developments anticipated by the Army in Force XXI create serious compatibility problems in future coalition operations? This briefing provides the necessary context to address the question. It examines three past operations—Desert Storm, Uphold Democracy, and Joint Endeavor—and seeks to identify compatibility lessons learned, analyze their significance for coalition effectiveness, and propose possible implications for future operations. Key among the technology-related compatibility problems were incompatible C4I capabilities, differing operating procedures, and political sensitivities. How much these incompatibilities stressed the coalition's ability to conduct the operation varied according to case-specific characteristics such as intensity of conflict, degree of integration among national contingents, and time available to rectify problems before deployment. Compatibility problems were either "worked around" by lessening the incompatibility's impact on the conduct of the operation or "fixed" by eliminating the source of the incompatibility. The mix of fixes and workarounds changed across operations and depended on situational factors such as intensity of conflict and the nature of the coalition.

AB-219-A Expandability of the 21st Century Army. J. Dewar, J. Wendt, S. Edwards, S. Bankes. June 1998.

The primary goal of this research was to develop an intellectual framework that allows for the discussion and manipulation of issues related to expanding the Army today and out to 20 years in the future. Through an exploratory modeling framework, the authors checked the logic of current thinking about the ability to expand the Army. That thinking generally, expressed colloquially, is that expansion timelines will be dominated by the time it takes brigades to get through advanced training at combat training centers until all current equipment has been used up. After that, the expansion will be dominated by the capacity of the industrial base to generate more equipment. Preliminary results suggest the continuation of those constraints over a wide variety of potential futures. Further work will concentrate on parameterized costs and their effect on rational designs for an expandable Army.

AB-225-A How Often is Enough? National Guard Training at the Combat Training Centers (In-Progress Review). T. F. Lippiatt, J. Sollinger. August 1998.

Training at the Army's combat training centers is thought to confer a number of benefits, particularly the opportunity for a combat brigade to synchronize all its battlefield operating systems and to fight a professional opposing force. Active Army combat brigades go to the CTCs about once every 18 months. The Army National Guard has 15 enhanced separate brigades that also have the opportunity to go to the CTCs. They can do so once every eight years if every brigade takes advantage of its opportunity. This briefing outlines the purpose and approach of an Arroyo Center project to assess the effects of CTC rotations on the training of the these brigades, to determine the cost of such rotations, and to assess their effect on the soldiers, unit readiness, and recruiting and retention. The project will also identify and assess an expanded range of enhanced training opportunities for the National Guard brigades.

AB-228-A Forecasting the Effects of Army XXI Design Upon Multinational Force Compatibility. B. Nichiporuk. November 1998.

It is likely that most future U.S. Army operations will be conducted with allies or as part of a coalition; thus, the ability of the Army to operate effectively in concert with other nations is an important issue. This annotated briefing seeks to identify the aspects of Army XXI that could create difficulties in multinational force compatibility, and recommends policies and procedures to ameliorate the problems. The analysis focuses on the Army's ability to operate with West European NATO forces because they have more modern equipment than our other allies and partners and have worked in conjunction with the U.S. Army for years. If Force XXI advances create compatibility problems with NATO forces, the problems are likely to be greater with other allies and partners. Some of the key aspects of Army XXI (C4I, force employment, logistics) could make it harder to operate as part of a multinational force, especially in short-warning contingencies requiring power projection outside of Europe. Three policy/procedural approaches would help reduce incompatibility: anticipating command structure requirements, increased technical/operational information sharing, and intensified engagement efforts.

AB-231-A Evaluation of Alternative Price and Credit Policies: Preliminary Results. M. Brauner, E. Pint, D. Relles, R. Eden. August 1998.

This annotated briefing documents preliminary results of an evaluation of five alternative price and credit policies that was conducted in support of the Army's Credit and Pricing Process Improvement Team (CPIPT). According to evaluation criteria approved by the CPIPT, policies were desired to have the following characteristics and consequences: Be affordable within current OMA budgets, facilitate reduction of wholesale inventories, improve choice of installation vs. depot repair, encourage appropriate use of local purchase, facilitate adjustments of local inventories, reduce incentives to redistribute parts, and reduce financial uncertainty. This briefing highlights the quantitative evaluation of the first criterion and offers qualitative evaluations of most other criteria. Preliminary results indicate that each of the alternatives offers some benefits under at least one of the criteria, but most of them also have some potential negative consequences.

AB-245-A Future Army Software Engineering: Moving from Traditional Software Development to Object-Oriented Methodologies. J. Rothenberg, S. Cammarata, I. Kameny. November 1998.

This project advised DISC4 and the Army Chief Information Officer (CIO) on whether to migrate to object-oriented software development (OOSWD) and component-based software engineering (CBSE). There appears to be little coordination across Army software projects; the Army faces a heterogeneous mix of legacy systems, current systems, and planned systems that must coexist and interoperate, producing "steady-state heterogeneity" well into the future. Approaches to OOSWD and CBSE are evolving so rapidly that it is premature to pick clear winners, yet the use of different approaches makes interoperability and reuse unlikely. Furthermore, the Army's needs are different from those of commercial developers: in particular, commercial planned obsolescence makes the Army's reliance on commercial off-the-shelf software (as in the DII COE) questionable. The authors recommend that the Army CIO develop a "high-level policy/process strategy" for managing software development, which makes assumptions explicit and monitors them to allow the reversal of decisions that become untenable.

AB-247-A Impressions of the Joint WARfare System (JWARS). L. R. Moore III. September 1998.

The Army faces major decisions on funding, structure, and modernization. An important role for simulation-based analysis is to inform these decisions. The Joint Warfare System (JWARS), if and when brought to full capability, will correct some of the shortcomings in the legacy models used for joint campaign analysis. There will still be institutional issues concerning the driving assumptions used by the various services in their analysis efforts. How these assumptions affect JWARS processes will be hard to determine and crucial to understanding the results obtained from JWARS. Thus, the Army needs to maintain a cadre of well-trained, experienced analysts to produce credible JWARS results. There will still be important unmet needs for other types of analytical methodologies, models, and capabilities when JWARS is fielded to support, augment, and verify the insights derived from JWARS runs. There are some steps the Army should take to improve JWARS and its prospects for success: (1) Continue to employ individuals with good skills in math programming, command decision modeling, attrition integration methodologies for JMEM/SABSEL and indirect fire, mobility and deployment, strategic and intra-theater logistics, and space; (2) remain involved with and provide constructive criticism of the JWARS conceptual model and simulation design; (3) avoid unnecessary requirements and impossible schedules; and (4) encourage basic research into important phenomenology. Above all, the Army should prepare now for the QDR that will be supported by the limited IOC version of JWARS replacing MIDAS/TACWAR.

AB-251-A Management of OPTEMPO and PERSTEMPO in FORSCOM: A Status Report. R. E. Sortor, M. Leed, H. Leonard, J. M. Polich. August 1998.

Senior Army commanders cite turbulence in units, caused by increasing operating tempo ("OPTEMPO") and higher rates of personnel movement ("PERSTEMPO"), as an early warning of future readiness problems. This briefing describes conclusions from a series of unit visits and discussions with the staff at HQDA and FORSCOM. In the case of the divisional forces, interviewees at all levels generally reported that the deployment activity and workday while in garrison for the personnel in the maneuver companies was not a particular cause for concern. Diverse types of support units did express concern with the higher level of workload among the unit members both from deployment activity and from in-garrison support while at home station. We were also told that deployment tempo was a problem for selected MOSs and unit elements. Results from these exploratory visits to operating units suggest that "tempo" effects, both the near and longer term effects, may be most telling on battalion and brigade staffs. Such staffs are faced with planning and balancing OPTEMPO/PERSTEMPO demands against the demands of unit training. Further, the difficulty in balancing such demands could have potentially serious implications for the warfighting skills of future combat unit leaders.

AB-254-A Future Army Forces: A Capstone Project's Summary Report. R. E. Darilek. March 1999.

This briefing presents interim results from the Arroyo Center's "capstone" project on the Army's continuing efforts to develop forces for the 21st Century. The project focuses on forces the Army has identified as relevant to its longer-term future. The Army XXI force is based largely on systems that have been digitized to the maximum extent possible. This force could be fully developed and fielded around 2010. The Army After Next is a notional force, the contours of which have not yet been decided, that would not be in the field until approximately 2025. The Army has the time available to plan and decide deliberately on what its future forces should consist of, when new force elements should come into existence, and how different force types should be integrated. The Army should take full advantage of this available time—there is, in fact, a window of opportunity for deliberate planning and decisionmaking. To take full advantage of this opportunity, the Army must start now by pursuing a systematic approach to future force issues, but it must also take its time to avoid becoming overly focused on particular "futures" or on narrowly limited sets of technologies until at least 2010.

AB-255-A Implementing Guidelines: An Overview. S. Cretin. September 1998.

This draft proposes that the Army Medical Command (AMEDD) adopt an approach to clinical improvement consisting of four phases: (1) Select important clinical problems as the targets for improvement; (2) select nationally recognized, evidence-based guidelines and tailor them to local settings and providers; (3) disseminate guidelines in a clinically meaningful, digestible form, along with suggested methods and tools for improving compliance; and (4) measure compliance with key guideline recommendations, clinical outcomes (where feasible), patient satisfaction, and costs, using these data to evaluate the impact of guidelines and stimulate continuous improvement in care. Based on the experiences of nonmilitary health care organizations, successful use of guidelines depends on producing clinically relevant, evidence-based guidelines on topics of importance to clinicians. Multidisciplinary guidelines tailored to skill levels of providers and locally available resources are also important. Building on existing systems to remove barriers and create multiple practice supports is also an effective strategy. Finally, regular review of process and outcome measures is essential to keeping the guideline process on track. The Arroyo Center is working with AMEDD to develop a guideline implementation process, including a set of supporting tools and techniques. These will be piloted in selected sites for two guidelines: asthma and low back pain.

AB-256-A Implementing Practice Guidelines in the Army Medical System: A Demonstration. S. Cretin, D. O. Farley. September 1998.

The Arroyo Center is helping the Army Medical Department (AMEDD) develop and evaluate a method for implementing clinical guidelines. Asthma and low back pain (LBP) were targeted as initial topics, and clinical consultants involved with care for these conditions attended a conference in May 1998. The conference engaged participants' support for using practice guidelines across Army MTFs to improve care for servicemen and families. Expert panels on LBP and asthma met during July to review and adapt existing guidelines. Since July, the AMEDD guideline project adjusted its timetable to coordinate with the VA/DoD effort to adopt a single standard of care across military and VA systems. Demonstration site selection will be finalized by September. Team leaders from the LBP demonstration MTFs will be trained in the implementation process in November. Asthma will follow in spring 1999. The evaluation for asthma and LBP will use a combination of clinical indicators, interviews with key participants, site visits, and surveys. Based on findings, the authors will refine the implementation process and select a second round of guidelines. The objective is to begin integrating the guideline process into AMEDD operations during FY00.

AB-261-A Selecting and Implementing an Improved Price and Credit Policy: Key Findings. M. Brauner, E. Pint, D. Relles, R. Eden, J. Bondanella. October 1998.

As the Army moves toward implementation of a Single Stock Fund, some of the important decisions to be made involve the pricing and credit policies that will be adopted. In the spring of 1998, the Army established a Credit/Pricing Integrated Product Team to develop alternative policies and identify criteria for evaluating them. The Arroyo Center was tasked to conduct the evaluation. This Annotated Briefing documents the key findings of that evaluation. Five alternatives were evaluated, including one that has already been selected as the interim policy and a variant of the interim policy that incorporates a number of potential enhancements. The analysis utilized detailed data from across the Army to understand the effect of each alternative on the funds that the field would require to maintain equipment readiness and the resources that the working capital fund must have to remain solvent. The study concluded that the interim policy would be superior to the current policy in many respects, but it includes features that are likely to increase total Army procurement and repair costs. The alternative that included enhancements to the interim policy would likely avoid these shortcomings.

AB-262-A Moving Army Supplies Overseas: The OCONUS Order and Ship Process. M. Wang, K. Girardini, P. Boren. October 1998.

This analysis applies the Velocity Management (VM) "Define, Measure, Improve (DMI)" methodology to the OCONUS Order and Ship (O&S) process, the process that supports and replenishes spare and repair parts from wholesale supply depots to overseas troops. Three questions are of particular interest: (1) How much delay is caused by sourcing from nonprimary depots? (2) Which is faster, the Air Force (MilALOC) or commercial carriers (ComALOC)? (3) What is gained from bypassing the consolidation and containerization points (CCP)? Sourcing from nonprimary depots, which is necessary when stocks have not been properly positioned geographically, leads to an average one-week delay in OST. Interestingly, OST performance for MilALOC and ComALOC shipments palletized at the CCP are roughly identical. Finally, bypassing the CCP by sending parts directly from any depot to the customer reduces OST by a week. The data suggest that opportunities to improve both MilALOC and ComALOC channels exist in different processing segments.

AB-263-A C2 Protect—Analytic Framework and Assessment of Management Plan. L. Joe, J. McEver. October 1998.

The Army has developed a Management Plan for Command and Control Protection, which links strategies of protect, detect, and react to specific functional responsibilities for Army agencies. The plan focuses on management approaches to the problem. In this study, we developed an analysis framework for elaborating the linkage between strategies and specific tasks. We specifically added additional layer of organizational principles to the management plan to aid understanding and check for comprehensiveness; added explicit consideration of technical principles and mechanisms to link technical and organizational approaches. We then applied the framework to the plan, examining how stated functional responsibilities match organizational and technical principles of C2 Protection. We found that the plan was comprehensive in that it covered all of the principles, but that additional emphasis was needed on education and training of operators and developers and on enforcement mechanisms. Additionally, when we examined the problem from an operational perspective, the plan emphasized planning and development stages of system development. More emphasis is needed during the acquisition cycle and during actual operations of the systems.

AB-269-A Using Velocity Management to Improve Logistics Quality: Serviceable Returns as a Quality Indicator. E. Peltz, K. Girardini, A. Lackey, M. Totten. January 1999.

Velocity Management (VM) aims to replace mass with speed and accuracy to improve the ability of Army logistics to sustain the force at a lower cost. The Army has made dramatic gains in the speed of some logistics processes, but the logistics leadership has recognized the need for a greater focus on accuracy to gain the full benefit of the VM approach. Understanding that the generation of local excess and the associated serviceable returns are creating a drain on logistics resources, the Army's logistics leadership initiated work to extend VM implementation to diagnosing and reducing this problem.

This briefing is about the first step of this work, defining the problem of local excess and serviceable returns. This step employs measurement to frame and evaluate the impact of the problem. The measurements then point to high-leverage starting points for future work to identify and correct the root causes of events that generate locally excess materiel and require serviceable returns. Through root cause analysis, the Army can identify quality and business practice problems in the stockage determination, order and ship, repair, and financial processes that lead to local excess and serviceable returns. By correcting these problems, the Army will not only continue to increase the speed of logistics processes but also improve its ability to get the right item to the right place the first time. This should enable the Army to concurrently reduce the cost of the logistics process and improve the speed of repairs.

AB(L)-275-A Redesign of AMC's Technology-Generation Function: Insights and Considerations. K. Horn, E. Axelband, C. Wong, I. Chang, D. Kapinus, P. Steinberg. November 1998.

This annotated briefing presents the results of a study supporting the redesign of Army Materiel Command's (AMC's) technology-generation function. The study finds that while AMC has supported several roles in the past, in today's period of leaner science and technology budgets, it should focus on supporting its smart buyer (SB) role; and AMC can improve its SB capability by encouraging more communications with concept and materiel developers and through more research collaborations with organizations outside the Army. In addition, significant cost and personnel savings can be accomplished by implementing acquisition reform initiatives that emphasize leveraging and cost-sharing, and savings can be supported and capability improved by adapting three alignment principles. Finally, the study finds that organizational redesigns can be used to strengthen ties to concept and materiel developers, better integrate technology, acquisition, and logistics, and elevate proponency; however, to improve SB capability and perform technology generation with fewer acquisition workforce personnel, such reorganizations must be implemented in conjunction with acquisition reform initiatives.

AB-281-A The Role of Crusader in the Army After Next. J. Gordon, J. Matsumura, R. Steeb. December 1998.

When the Army was asked by Congress in late 1998 to answer five questions related to the Crusader self-propelled howitzer system, the chairman of the Army's Crusader Study Advisory Group asked Arroyo for insights on how many Crusaders would be required as the Army transitions from Army XXI (roughly 2000-2010) to the AAN era (approximately 2010-2025). This briefing outlines three possible visions that the Army could adopt over the next two or three decades. These visions were developed from position papers the Army staff was preparing that chart several different major courses of action the Army could pursue from now through roughly 2025. Each vision postulates a different role and quantity of mechanized (heavy) forces. The quantity of Crusaders would depend on which course of action the Army actually follows. The authors conclude that since the AAN era force structure is not yet known, it is important for the Army to retain, for as long as possible, the maximum amount of flexibility in Crusader procurement plans.

AB-284-A Deployability in Peacetime: Interim Results. B. R. Orvis. March 1999.

The readiness of CONUS units and the deployability of personnel are issues assuming greater importance as major combat units are asked to participate in peacetime operations such as Bosnia. The Army does not have a clear view of how these operations and deployability criteria affect force readiness, including the ability to execute major theater of war deliberate plans. This briefing provides an interim update on these issues, focusing on Stabilization Force deployments to Bosnia. Looking at the measure "Unit Status Report (USR) nonavailable for deployment," initial results find a stable rate of 4 percent or less for the 1st Cavalry Division, 10th Mountain Division, and Fort Riley. (The rate increases to up to 9 percent if one counts soldiers currently deployed elsewhere.) However, deployability can be lowered substantially by additional deployment criteria for OJF, notably: (1) availability for a minimum stay in country (Bosnia theater) of 90 days plus return to home station 45 days or more before an impending change of station or end of term-of-service; and (2) stabilization from OJF for one year after a dependent-restricted assignment of 140 days or longer. These additional criteria together serve to raise the nondeployable rate to 40–45 percent, depending on the length of deployment for Stabilization Force (SFOR) operations. Rotating multiple brigades from the 1st Cavalry further increases the nondeployable rate, due to stabilization of returnees from SFOR4 (involving the initial brigade). Because the high nondeployable rate of deploying units requires a great deal of cross-leveling, nondeploying units may have their readiness notably affected. The OCONUS rotation base may also be substantially affected, given the combined effects (removal) of soldiers currently deployed, those stabilized for one-year post-deployment, and the fencing of soldiers in units/installations preparing for upcoming SFOR operations.

AB-290-A Preliminary Strategy Briefing on AI/NA Training for DoD Personnel. D. Rubenson. January 1999.

The Department of Defense (DoD) has issued a new policy dealing with the relationship between the military and recognized tribes of American Indians and Alaska Natives (AI/NA). The policy is aimed at fulfilling DoD's part of the federal government's Trust responsibility to AI/NA. As part of the policy implementation process, the Army Environmental Policy Institute (AEPI) is formulating a strategy for training DoD personnel in AI/NA issues. This briefing forms the basis of the AEPI

strategy. It reviews alternative goals for the training and highlights options for who within DoD should be trained and in what material. It reviews existing AI/NA training programs and relates them to the training needed to implement the new policy. The briefing also indicates that some AI/NA issues not encompassed by the new policy (beyond Trust responsibility) can have important effects on the DoD core military mission. The briefing argues that training in these matters is equally as important as training to achieve compliance with the new policy.

AB-291-A Developing a Long-Term Strategy for Army Installations. W. M. Hix, J. G. Bolten, J. A. Dewar, D. Henry. February 1999.

The Army has few opportunities to change the structure of its installations. The end of the Cold War has brought some opportunities for base closings and realignments, and more may be in store. When opportunities do appear, the resulting decisions last for many years. Future basing decisions should take into account not only today's conditions and imperatives but those that may obtain during the expected life of the installations affected. In addition to dealing with uncertainty in external conditions, a long-term basing strategy should reflect the internal values and cultural imperatives of the Army and the relative priorities among its enduring goals. This research sets forth several visions, each reflecting a specific set of assumptions about future external conditions, a specific set of priorities among objectives, and assumptions about internal choices that reflect Army values and preferences about how to provide services and benefits. Each vision is assessed according to how well it fits the range of future conditions, furthers the Army's enduring goals, and suits its internal preferences. Finally, each vision serves as the basis of a blueprint for near- and long-term actions.

AB-292-A Assessing Alternative Army Force Structures. D. B. Fox, C. M. Jones, R. Brown, L. Lewis, J. Schrader. February 1999.

This research evaluates two sets of Army force structure alternatives. The initial alternatives were derived from an assessment made by the Congressional Budget Office that simply examined the deployment implications of reducing Army active duty structure. The authors extended that assessment by examining the warfighting implications and detailing the time requirements to train and deploy Army reserve forces in the absence of the active duty forces. The second set of alternatives illustrates how more radically designed Army force structure alternatives might be analyzed. While the specific alternatives analyzed do not represent current Army corporate positions, they do illustrate a range of alternative directions in which the Army might turn in the near-to-middle term based on existing technologies.

AB(L)-294-A How Velocity Management Metrics Relate to Readiness and to the Single Stock Fund. J. Folkeson, J. Dumond, R. Eden, K. Girardini, M. Lewis, D. Oaks. April 1999.

This annotated briefing documents a presentation developed to answer two questions posed by the Assistant Deputy Chief of Staff for Logistics. First, what is the relationship between the metrics proposed under the Army's Velocity Management initiative—metrics that focus on speed, quality, and cost of key logistics processes—and a traditional logistics metric such as equipment readiness? Second, what impact might the implementation of a Single Stock Fund (SSF) have on the proposed process metrics? The briefing answers the first question by addressing both the conceptual relationship and the empirical one, drawing on previously reported analyses of how process improvements affected equipment readiness at the National Training Center. In answer to the second question, the briefing notes that the same metrics will be needed under SSF, but their utility will shift with changes in management responsibility for improving the processes. The briefing closes by placing process metrics in the context of a "balanced scorecard"-like suite of metrics designed to help the Army logistics community achieve multiple strategic objectives.

AB-295-A Improving the Army's Resource Decision-Making. L. Lewis, R. A. Brown, J. Y. Schrader. March 1999.

This is an overview of work carried out in the Arroyo Center over a period of approximately five years that focused on reengineering the Army's key resource decisionmaking processes. The draft focuses on two important areas of Army resource decisionmaking: planning and programming. The Army leadership sought to change its planning and programming processes to make them more responsive to changes in the Department of Defense's (DoD) decisionmaking processes, which were precipitated by the 1986 passage of the Goldwater-Nichols legislation and the collapse of the Soviet Union in 1989. The Goldwater-Nichols legislation fundamentally altered the responsibilities of the military departments; it redefined their roles as providers of capabilities to the Commanders in Chiefs (CINCs), who are the demanders of capabilities. The Office of the Secretary of Defense and the Chairman of the Joint Chiefs of Staff function as the integrators of CINC demands and service responses to ensure that a balanced defense program is developed to meet near-, mid-, and long-term DoD goals. The draft describes a process that is being iteratively implemented in the Army that attempts to respond to the changes in both the resourcing and geo-strategic environments. The reengineered processes assist the Army in its ability to be responsive to a variety of operational demands while at the same time addressing its institutional needs.

AB(L)-305-A SROTC Staffing Experiment IPR: Contract Alternative. C. A. Goldman, D. Kapinus, M. Onesi, B. Orvis, K. Rosenblatt. March 1999.

In school year 1997-98, fifteen schools began implementing alternative staffing for Senior ROTC battalions, replacing about half of the active duty personnel with former military members working under a civilian contract. This briefing reports on the data collected over the first year of the experiment. The experiment assesses workload; advanced camp scores; recruiting and retention; and the perceptions of cadets, cadre, and school officials. On balance, respondents judged contract cadre about equivalent to active cadre in performing ROTC duties. Experimental schools performed very well on the quantitative measures. Advanced camp scores were equivalent between contract schools and nonexperimental schools. Recruiting and retention were at least equal at contract schools, and in some areas, contract schools outperformed nonexperimental schools. Overall, there is ample evidence that contract cadre perform about as well as active cadre.

AB-316-A The U.S. Army Role in Homeland Defense: An Overview. J. E. Peters, E. V. Larson. May 1999.

This briefing reports initial project findings, offers a working definition of homeland defense, summarizes the Army's current responsibilities in this area, and lays out an analytical approach for assessing current capabilities. The authors believe the threat to the American homeland is small, but perhaps growing. Current capabilities equip the Army for many of the challenges inherent in homeland defense, but analysis to date is not sufficient to draw a conclusion about the adequacy or the size of these capabilities. Emphasizing preemption, interdiction, protection, and prevention offers efficiencies over a purely defensive approach to homeland defense. While the Army must continue to fulfill its responsibilities in the consequence management and emergency response elements of several homeland defense-related programs, the authors believe the emphasis on homeland defense should be on the "front-end" programs that seek to deal with attackers before they can act. Homeland defense should be treated and resourced as a legitimate wartime mission, considered along with the major theater wars and smaller-scale contingencies that constitute the key elements of the planning problem set. The Army should develop a long-term, adaptive strategy for dealing with homeland defense by preparing for small to moderate threats now, and take the less expensive steps to position the Army in the event the threat grows.

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